

FIGURE 15: Linear Heater Assembly Overview

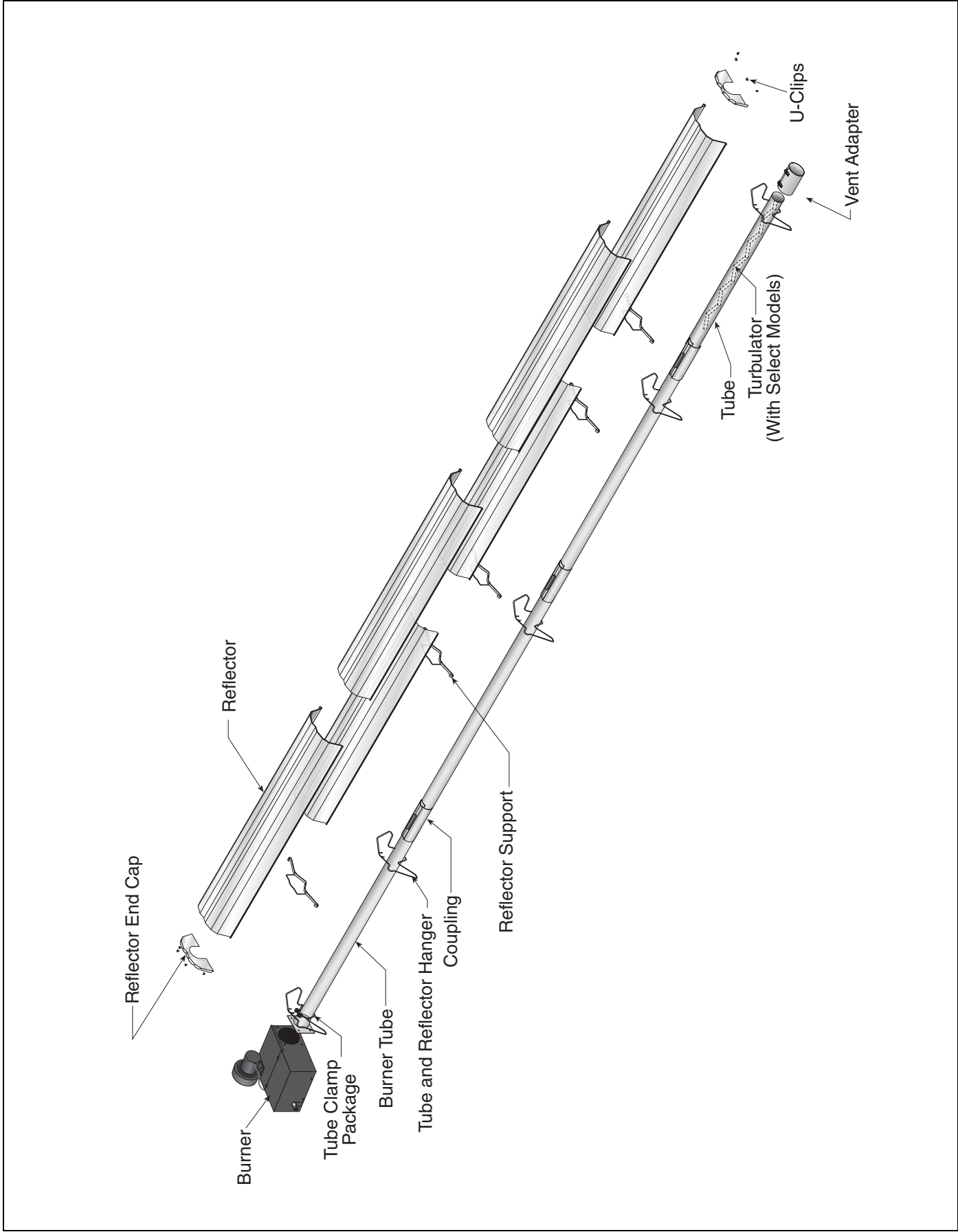








FIGURE 16: Linear Heater Layout Overview

LEGEND

-  Burner
-  Reflector
-  Tube
-  Tube/Reflector Hanger
-  Coupling Assembly
-  Vent Adapter

a = 14" (36 cm)
reflector width (not shown)

b = 2" (5 cm)
end cap to burner

c = 2" (5 cm)
end cap to hanger

d = 7' 6" (2.3 m)
distance first hanger

e = 10' (3 m)
distance between hangers

f = 12.5" (32 cm)
burner height

g = 11" (28 cm)
burner length

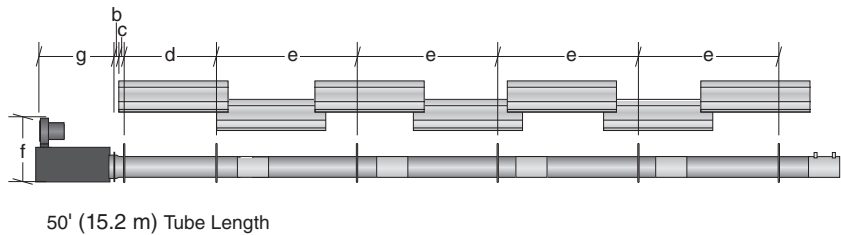
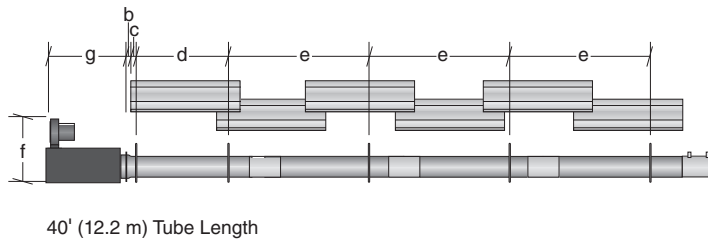
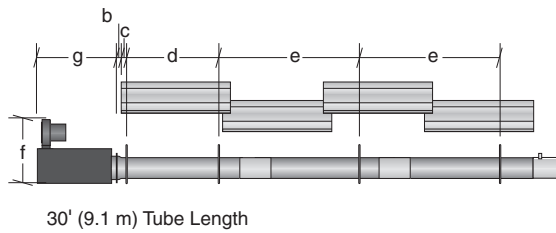
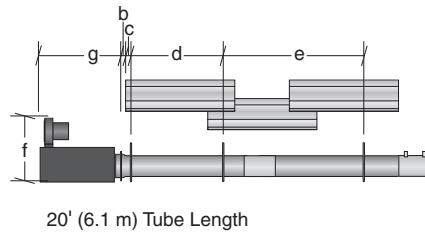
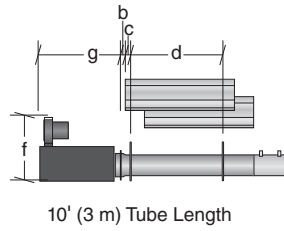
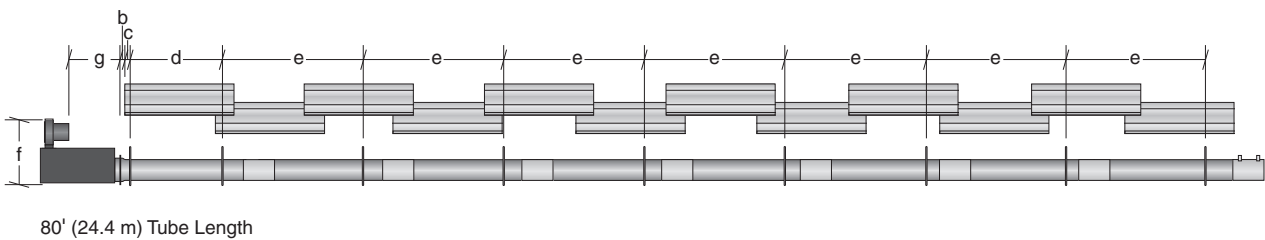
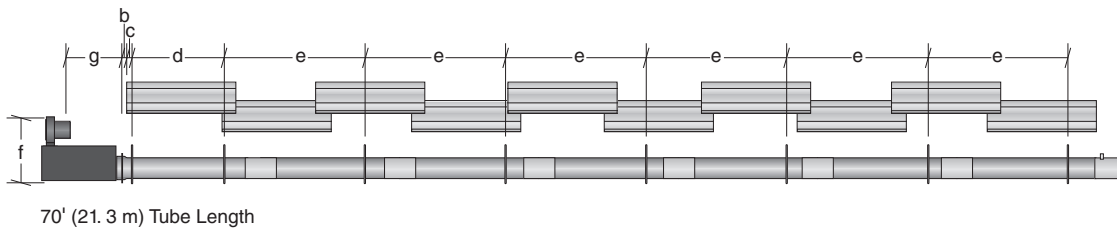
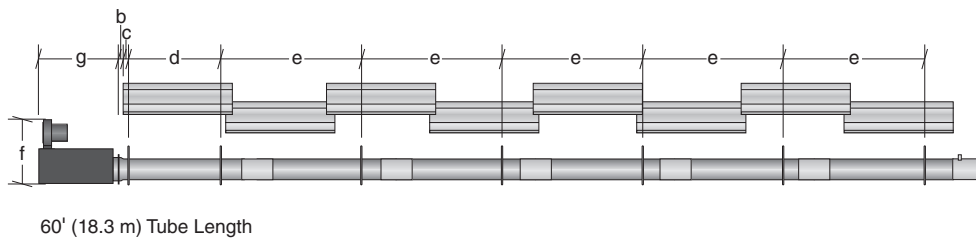
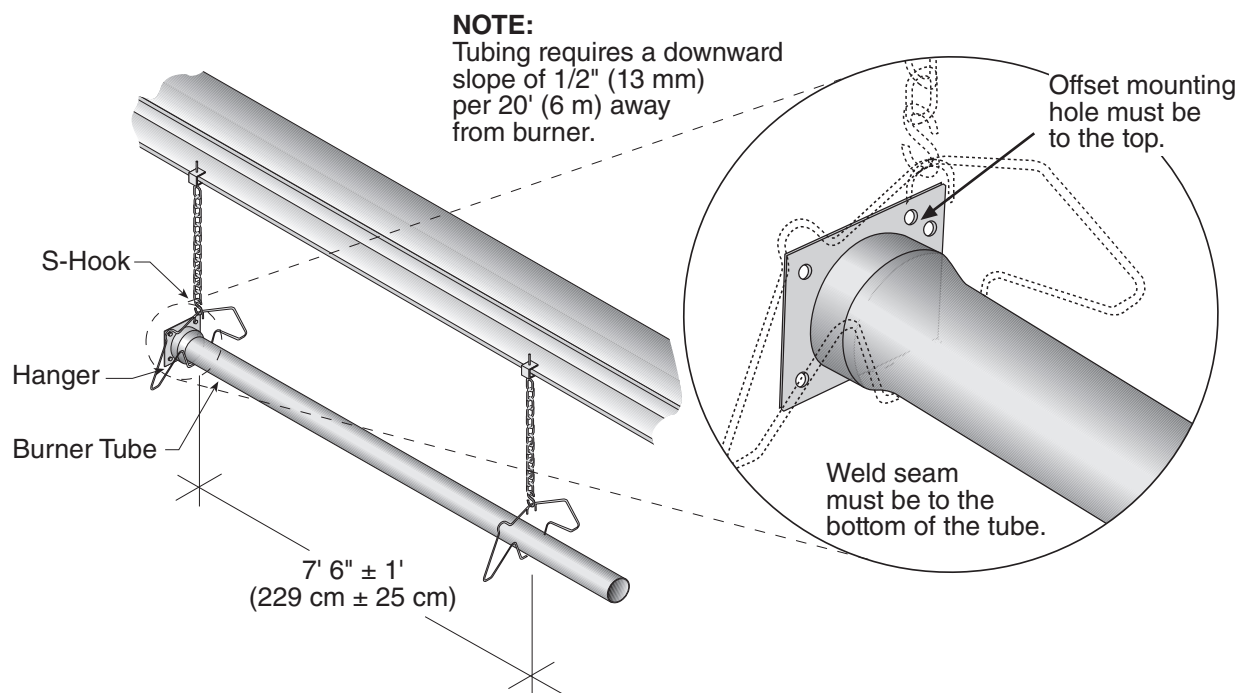


FIGURE 17: Linear Heater Layout Overview (Continued)

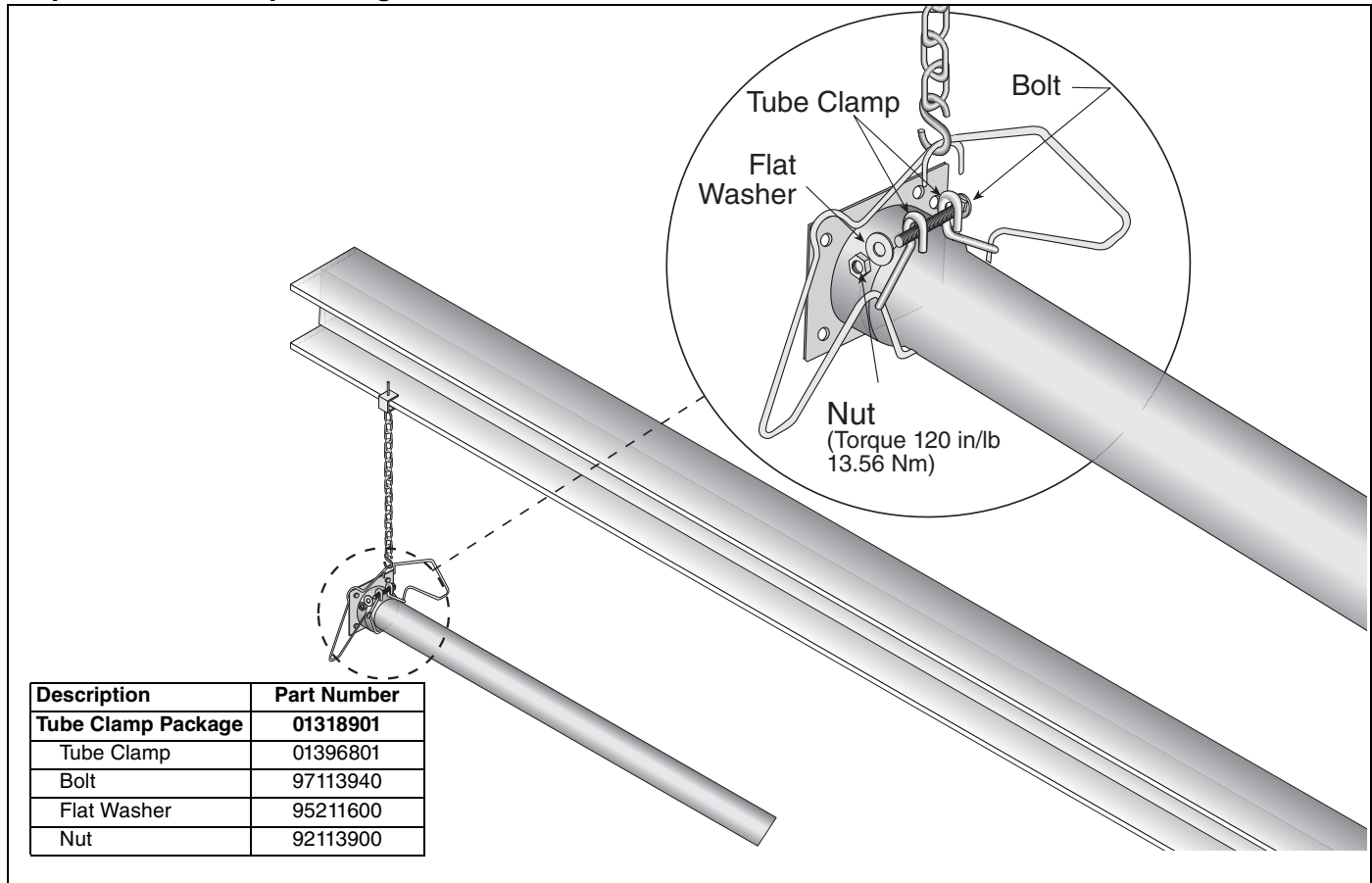


Step 6.1 Burner Tube Installation



Description	Part Number
Burner Tube	03051XXX
S-Hook	91907302
Tube/Reflector Hanger	03090100

Step 6.2 Tube Clamp Package Installation



Step 6.3 Coupling and Tube Assembly

A Close coupling with tab.

B Start slide bar/coupling lock onto coupling.

C Insert tubes into coupling.

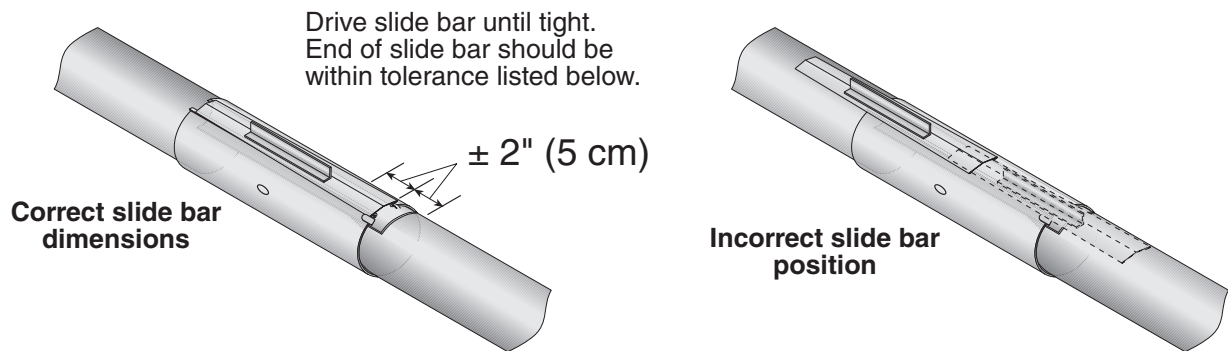
Orient coupling so that the impact block is in the 2:00 or 10:00 o'clock positions.

D Tighten coupling to join tubes.

Description	Part Number
Coupling	01329600
Slide Bar/Coupling Lock	01329700
Tube	91409XXX

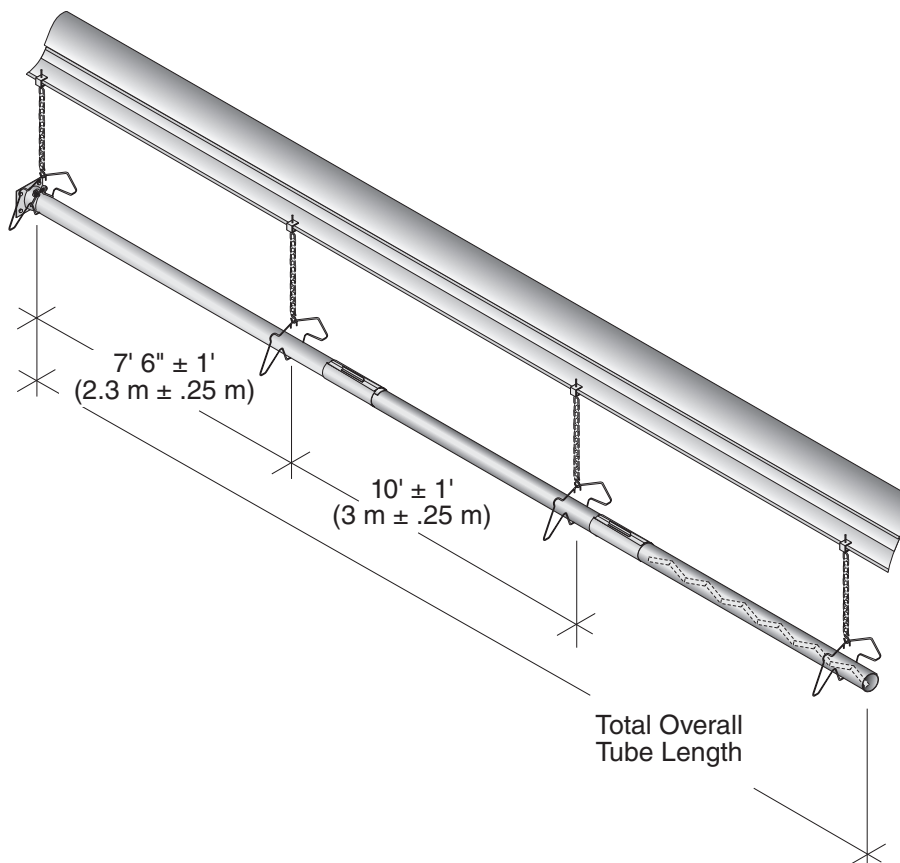
Step 6.3.1 Coupling and Tube Assembly (Continued)

Tighten slide bar as shown below.



- Repeat Step 6.3 A - D until all tubes are assembled. See Page 19, Step 6.3.2.

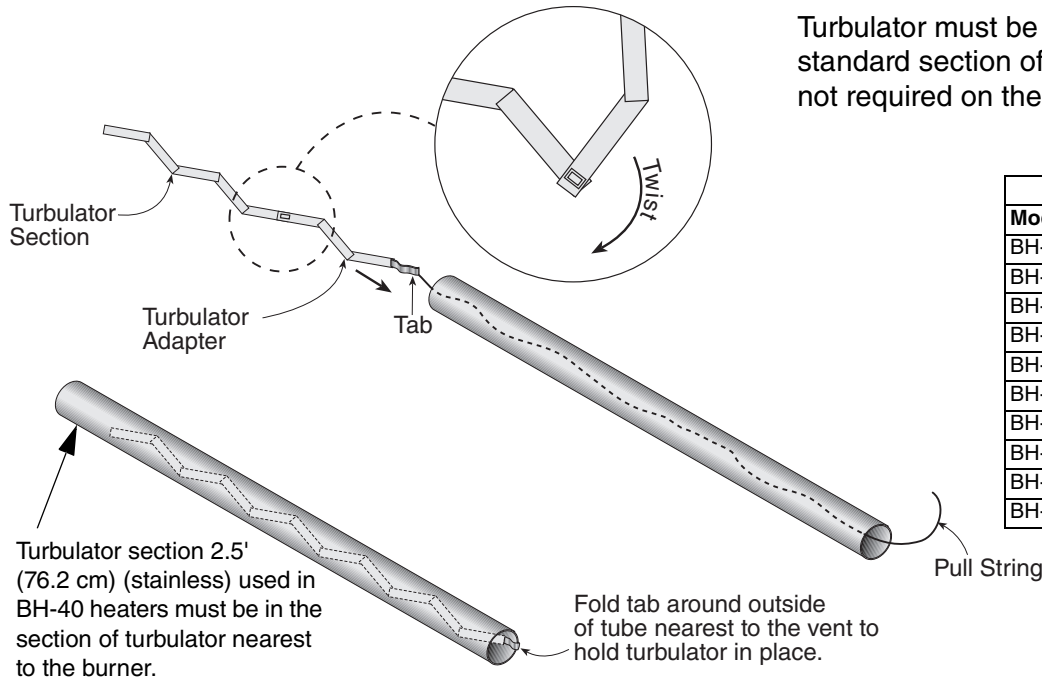
Step 6.3.2 Coupling and Tube Assembly (Continued)



Model	Tube Length Minimum
BH-40	10' (3 m)
BH-60	20' (6 m)
BH-80	20' (6 m)
BH-100	30' (9 m)
BH-115	30' (9 m)
BH-125	40' (12 m)
BH-140	40' (12 m)
BH-150	50' (15 m)
BH-175	50' (15 m)
BH-200	60' (18 m)

Step 6.4 Turbulator Installation

Turbulator must be installed in the last standard section of tube. Turbulator is not required on the BH-125/150/175/200.



Turbulator Installation	
Model	Tube Section
BH-40	1st 10' (3 m) Section
BH-60	2nd 10' (3 m) Section
BH-80	2nd 10' (3 m) Section
BH-100	3rd 10' (3 m) Section
BH-115	3rd 10' (3 m) Section
BH-125	N/A
BH-140	4th 10' (3 m) Section
BH-150	N/A
BH-175	N/A
BH-200	N/A

Description	Part Number
Turbulator Adapter 2.5' (76.2 cm)	03051503
Turbulator Section 2' (61 cm)	03051504
Turbulator Section 2.5' (76.2 cm)(Stainless)	03051505
Tube	91409XXX

Step 6.5 Reflector Installation

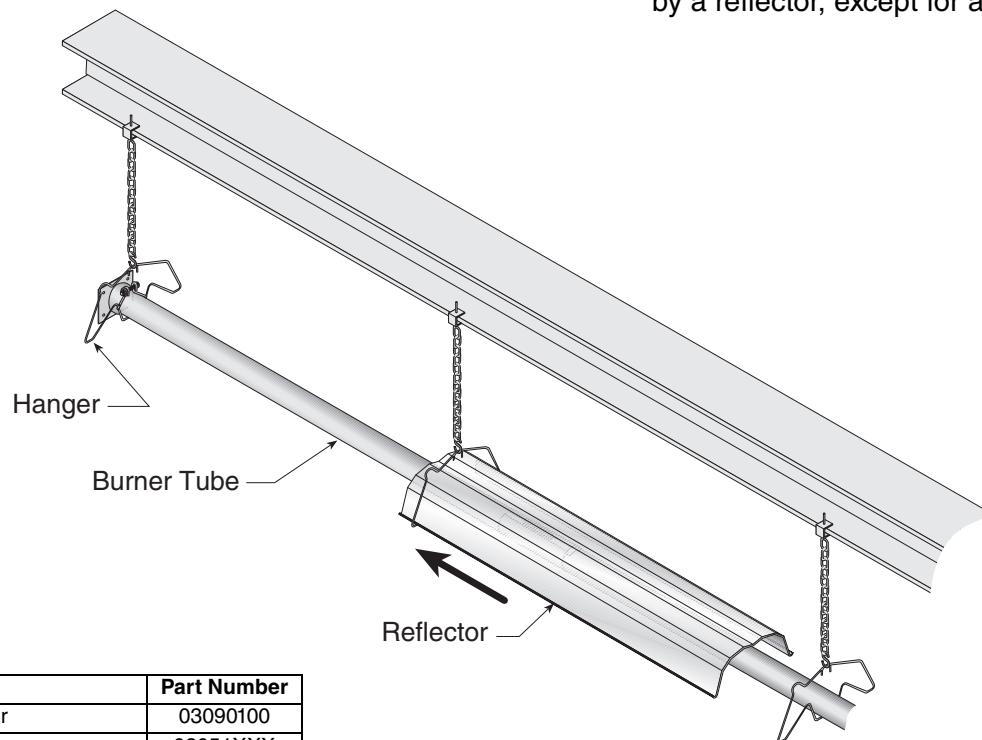
⚠ WARNING**Fire Hazard**

Support reflector with reflector hanger and support strap.

Reflector must not touch tube.

Failure to follow these instructions can result in death, injury or property damage.

NOTE: All tube surfaces must be covered by a reflector, except for a U-tube.



Description	Part Number
Tube/Reflector Hanger	03090100
Burner Tube	03051XXX
Reflector	02750303

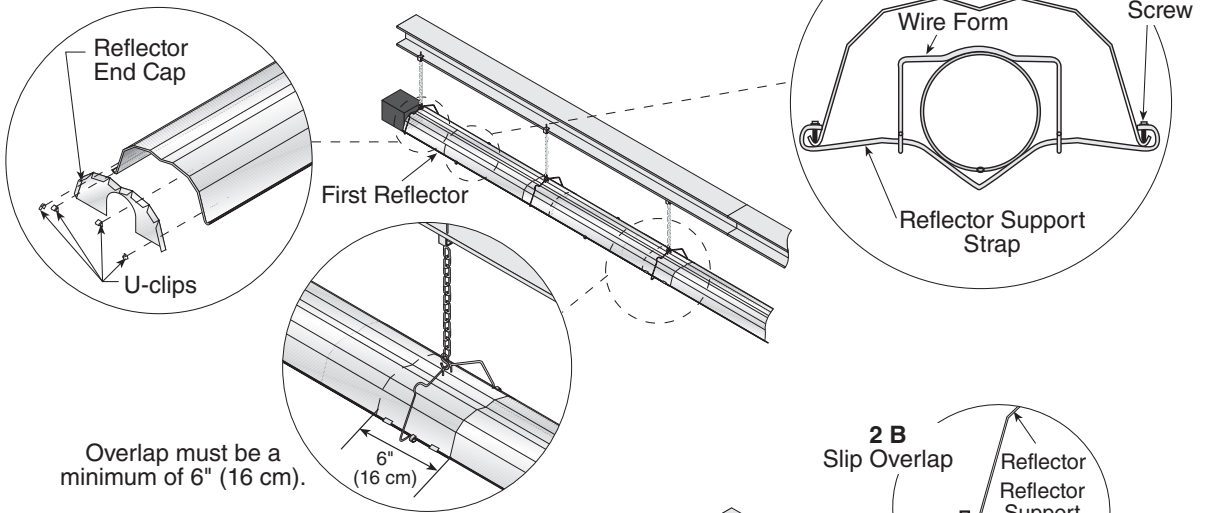
Step 6.5.1 Reflector, U-Clip and Reflector Support Installation

The pictorial drawings of the heater construction in Section 6 are schematic only and provide a general guideline of where hangers, reflector supports and U-clips are to be installed.

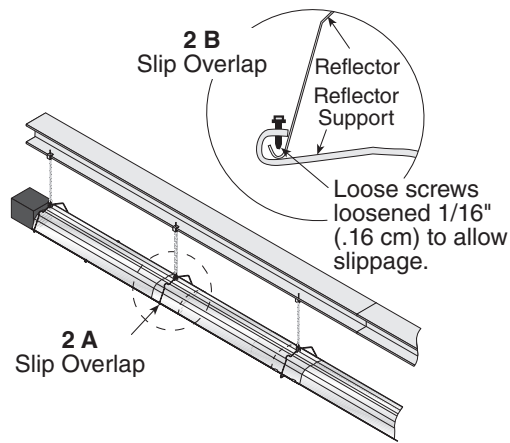
and reflector supports are used. The positioning of reflector supports and U-clips depend on the individual installation. The following rules must be observed.

To ensure proper expansion and contraction movement of the reflectors, a combination of U-clips

1. The first reflector after the burner must be affixed in the middle of the reflector with a reflector support and tight screws.

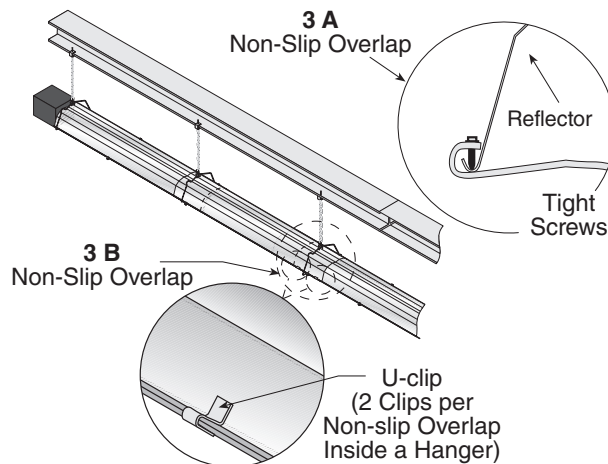


2. The overlap at the first and second reflector is a **slip overlap**. Thereafter, every third reflector joint is a slip overlap is achieved by either:
 - a.) both reflectors lay inside a hanger. (No reflector support needed.)
 - b.) using a reflector support with loose screws at the reflector overlap.



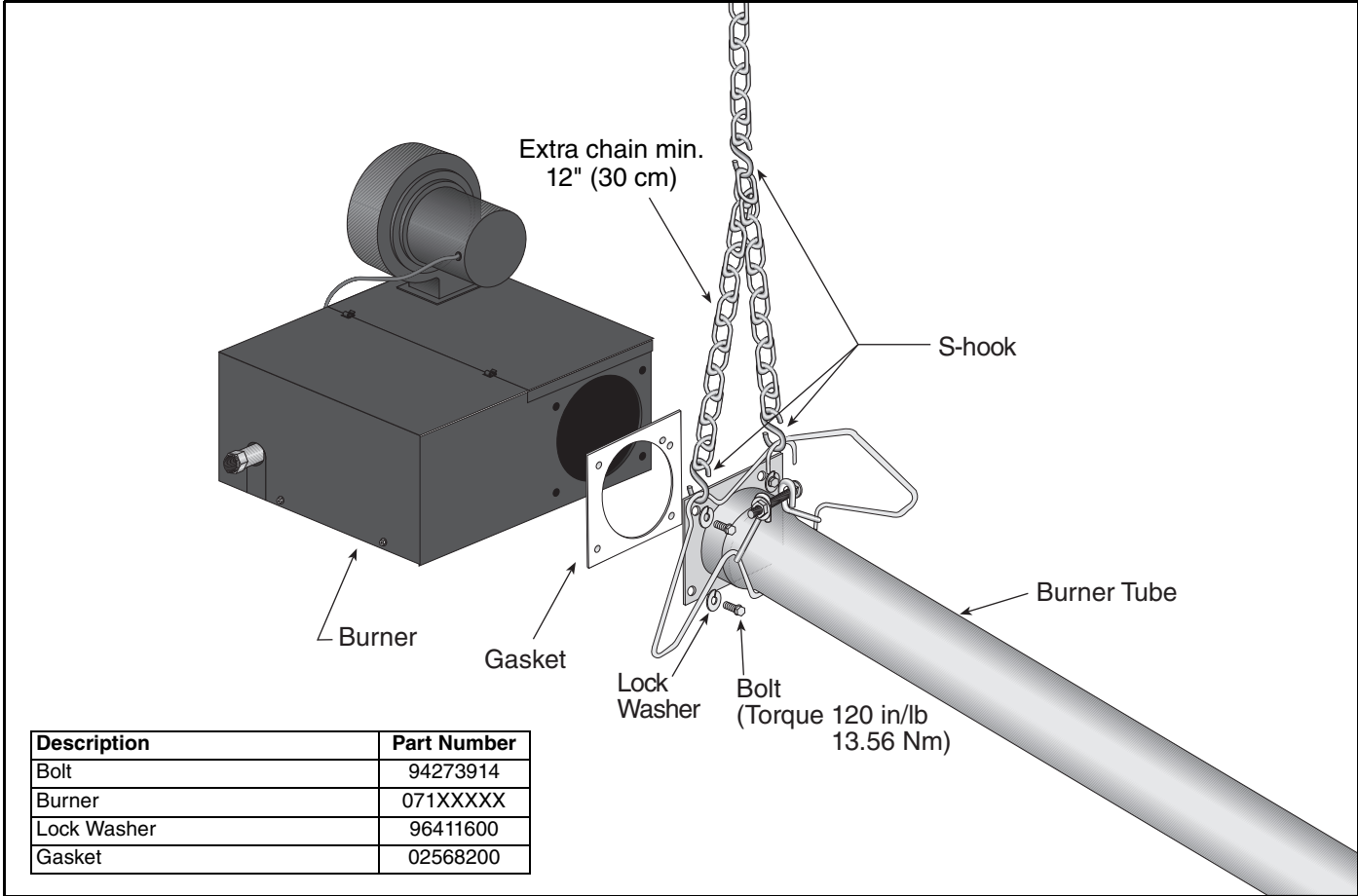
3. The remaining reflector overlaps require a **non-slip overlap** connection. To affix the reflectors together in a non-slip overlap either:
 - a.) use reflector support and tight screws.
 - b.) if both reflectors lay inside a hanger, u-clips or sheet metal screws may be used.

This section of three reflectors joined together must be affixed to the tube with at least one reflector support with tight screws.



Description	Part Number
Reflector Support Package	03050010
Wire Form	91908004
Reflector Support Strap	03050000
Screw #8 x 3/4"	94320812
U-Clip Package	91107720
Reflector End Cap	027508XX

Step 6.6 Burner Installation



Description	Part Number
Bolt	94273914
Burner	071XXXXX
Lock Washer	96411600
Gasket	02568200

SECTION 7: OPTIONAL HEATER ACCESSORIES**! WARNING****Cut/Pinch Hazard**

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

7.1 U-Tube Configuration

Heaters (except BH-40) are approved for optional U-tube configurations.

The U-tube may be installed in either a standard horizontal position, a 45° position or in an opposite 45° position as shown on *Page 6, Figure 7 through Page 7, Figure 9*. When using a U-tube configuration, the following additional rules must be adhered to:

- A minimum of 10' (3 m) on BH-60/80 and a minimum of 15' (4.5 m) on BH-100/115/125/140/150/175/200 is required between the burner and the U-tube.
- The correct turbulator (*See Page 20, Step 6.4*) must be installed in the last standard section of the tube.
- The burner must never be operated in a tilted position.
- The heater must be properly supported at all locations. *See Page 26, Figure 19.*

FIGURE 18: U-Tube Heater Assembly Overview

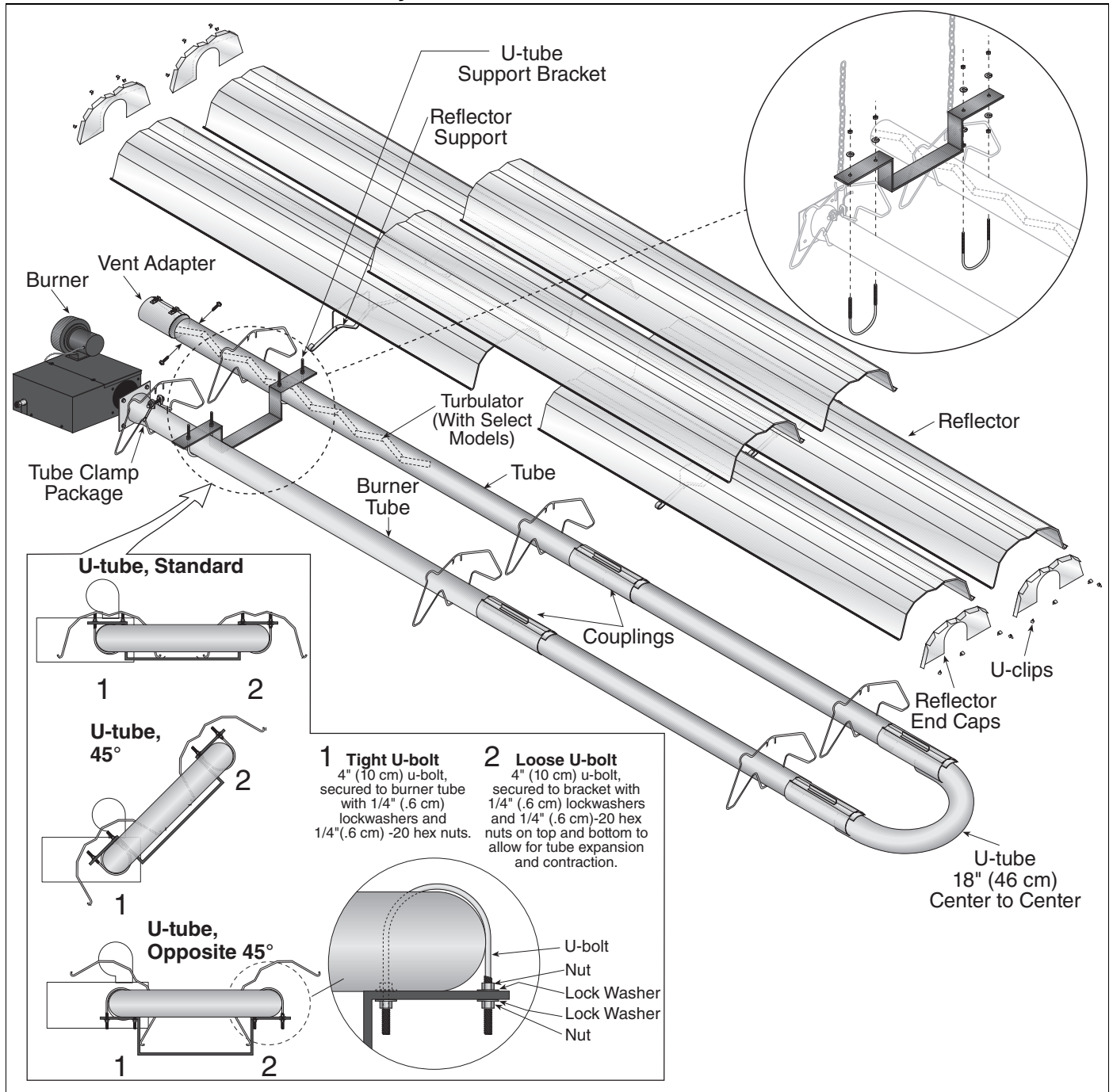




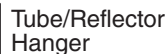





FIGURE 19: U-Tube Heater Layout Overview

LEGEND	
	Burner
	Reflector
	Tube 10' (3.0 m)
	Tube 5' (1.5 m)**
	Tube/Reflector Hanger
	Coupling Assembly
	U-tube
	Vent Adapter (Not Shown)

a = 14" (36 cm)
Reflector Width (Not Shown)

b = 2" (5 cm)
End Cap to Burner

c = 2" (5 cm)
End Cap to Hanger

d = 7' 6" (2.3 m)
Distance First Hanger

e = 10' (3.0 m)
Distance Between Hangers

f = 5' (1.5 m)
Distance Between Last Full Tube Hanger and Half Tube Hanger

g = 12.5" (32 cm) Burner Length

h = 11" (28 cm) Burner Height

* Requires the last **reflector** before the u-tube to be cut in half for use on both sides.

** Requires the last **tube** before the u-tube to be cut in half for use on both sides.

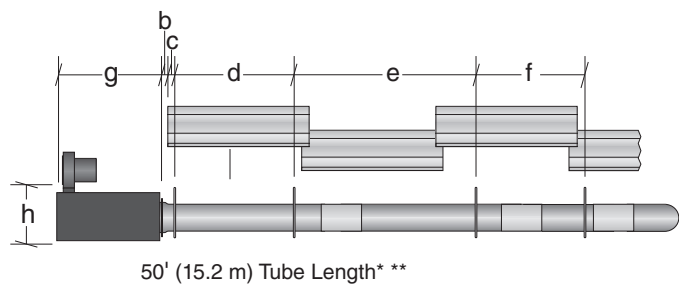
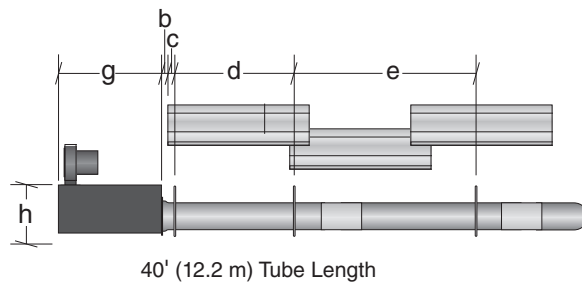
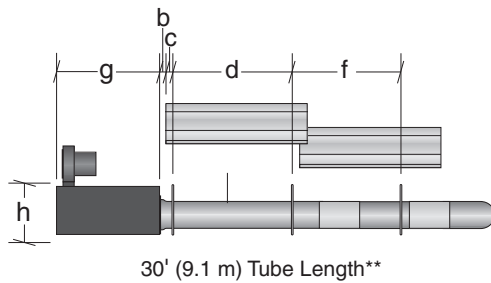
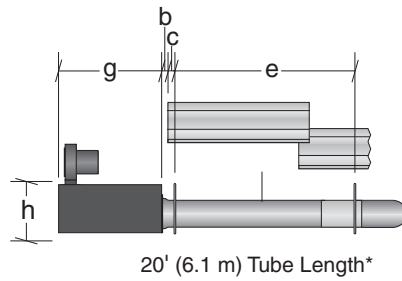
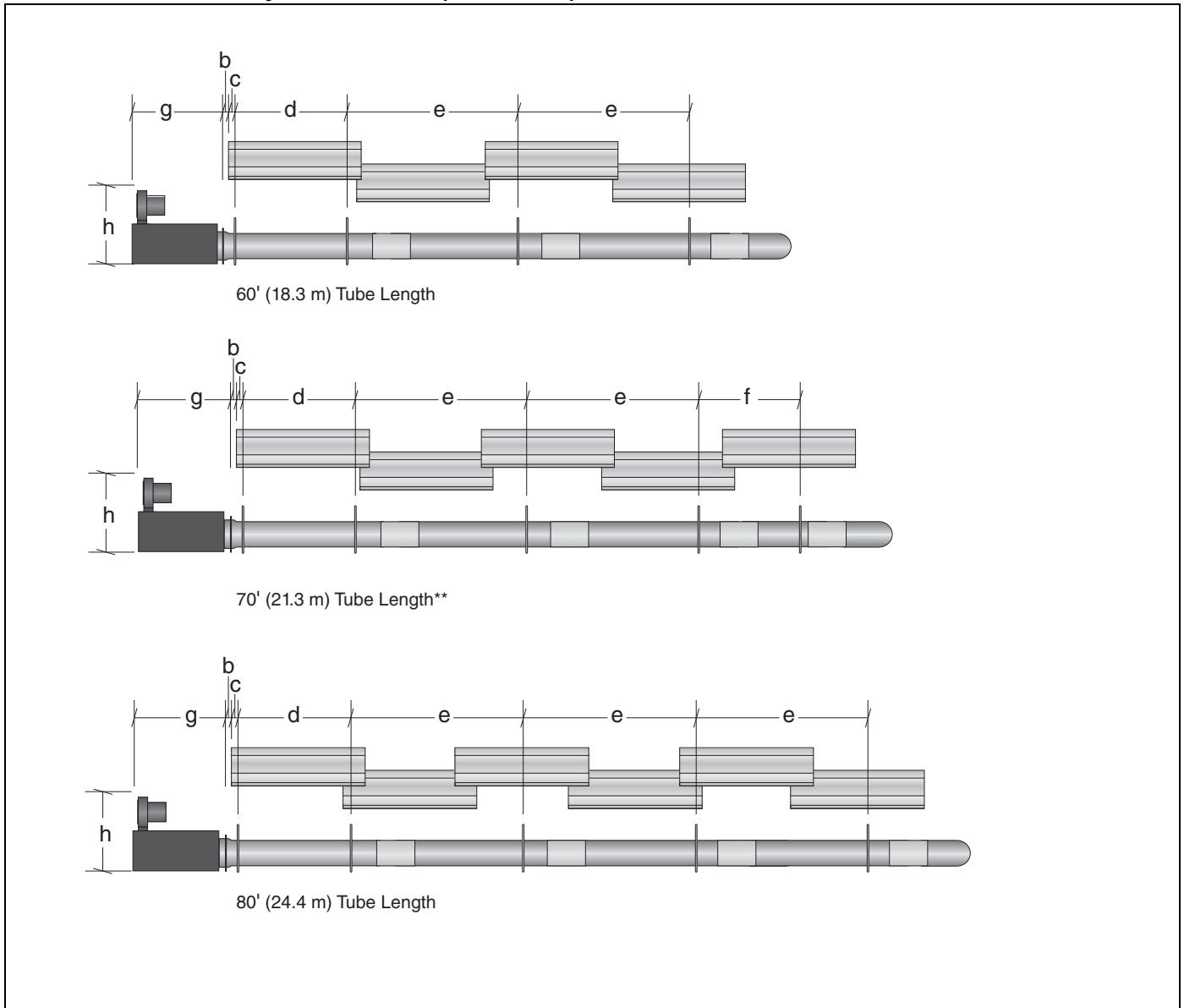
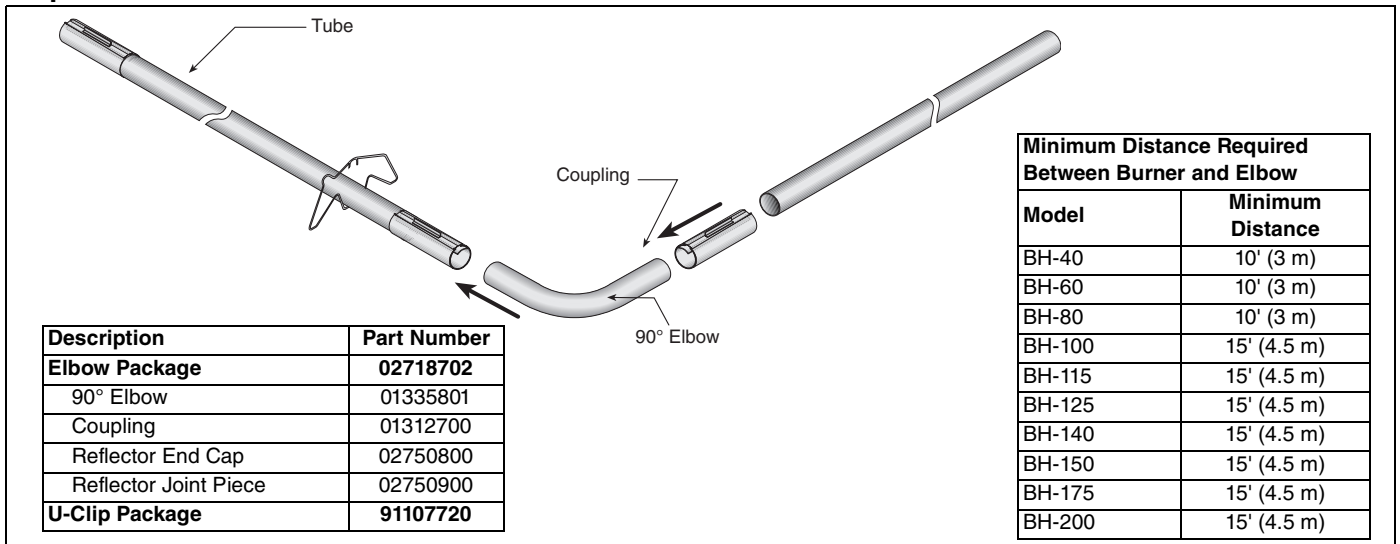


FIGURE 20: U-Tube Layout Overview (Continued)

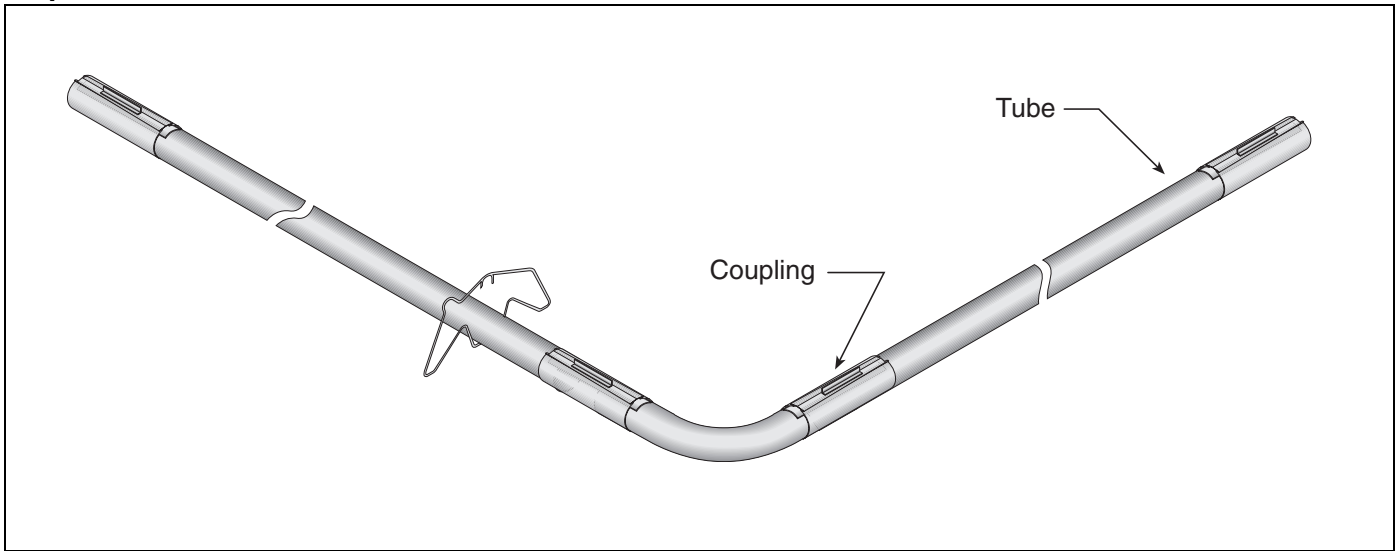


7.2 Elbow Package Configuration

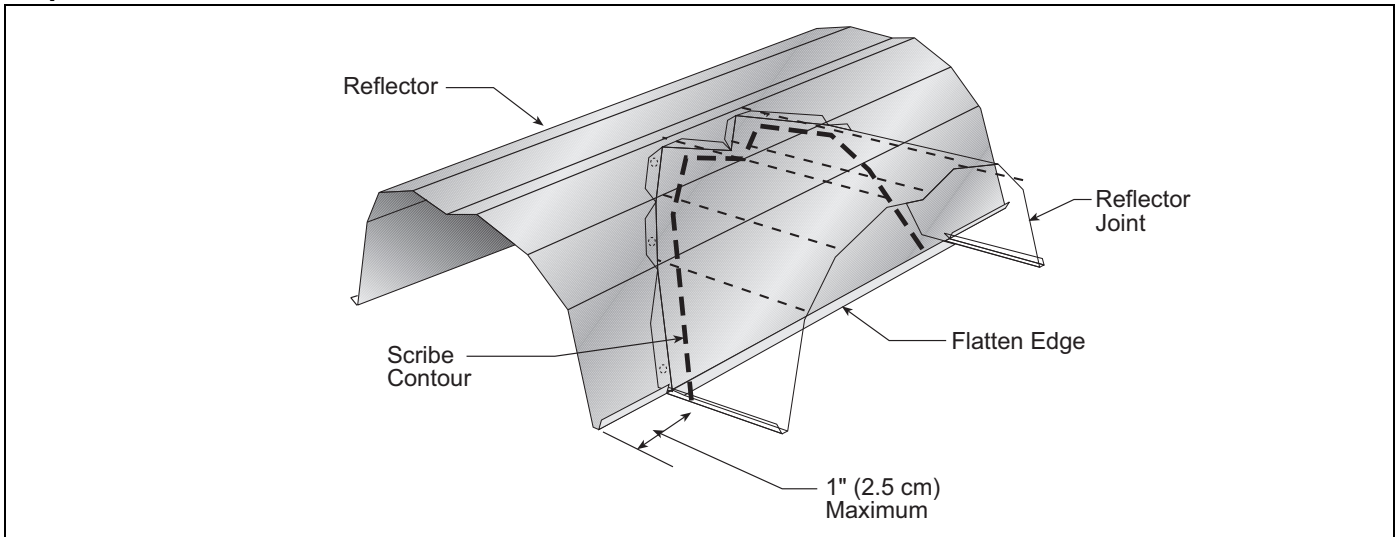
Step 7.2.1 Elbow Installation



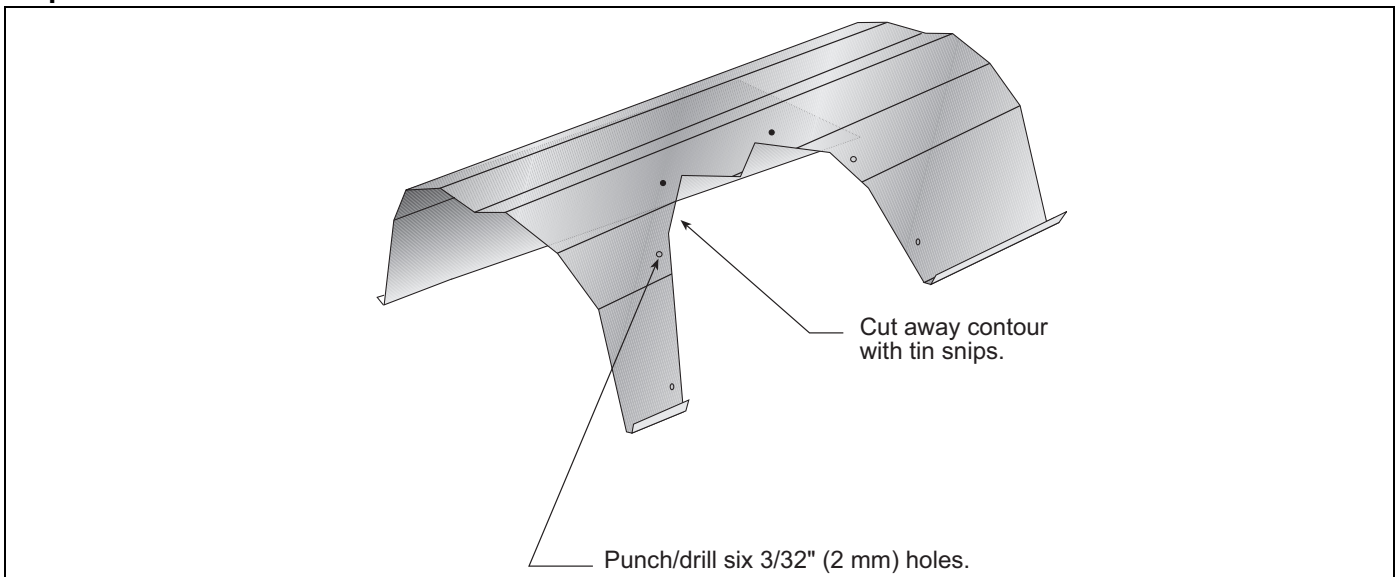
Step 7.2.2 Elbow Installation



Step 7.2.3 Reflector Joint Installation



Step 7.2.4 Reflector Joint Installation



Step 7.2.5 Reflector Joint Detail

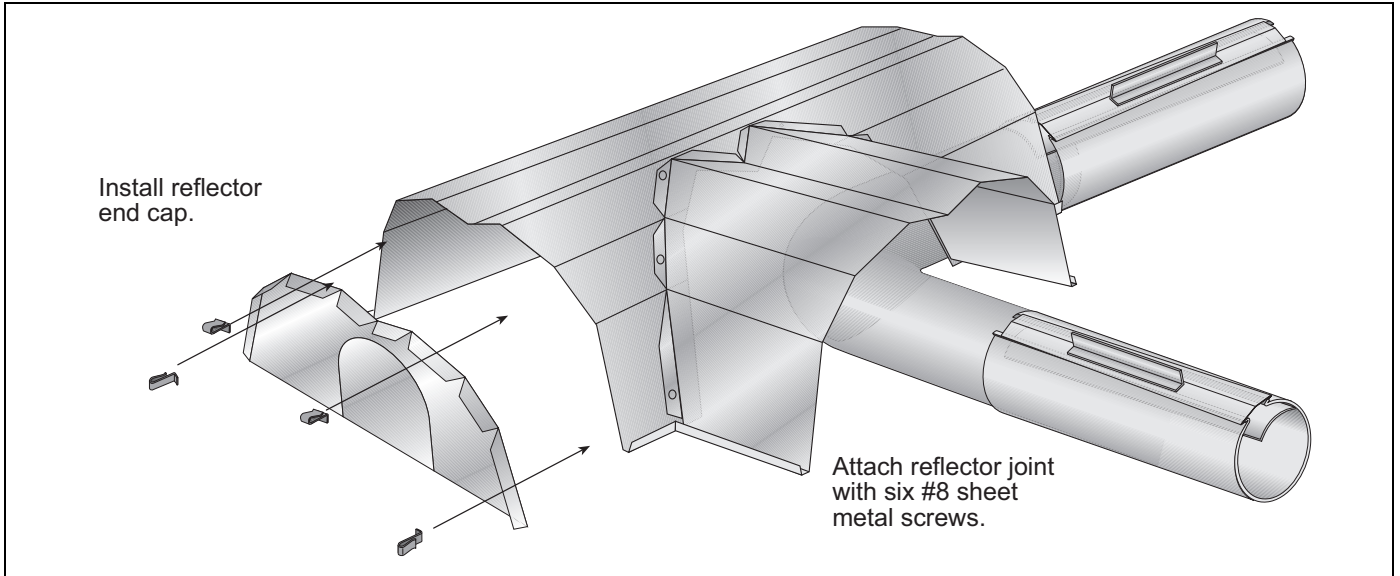
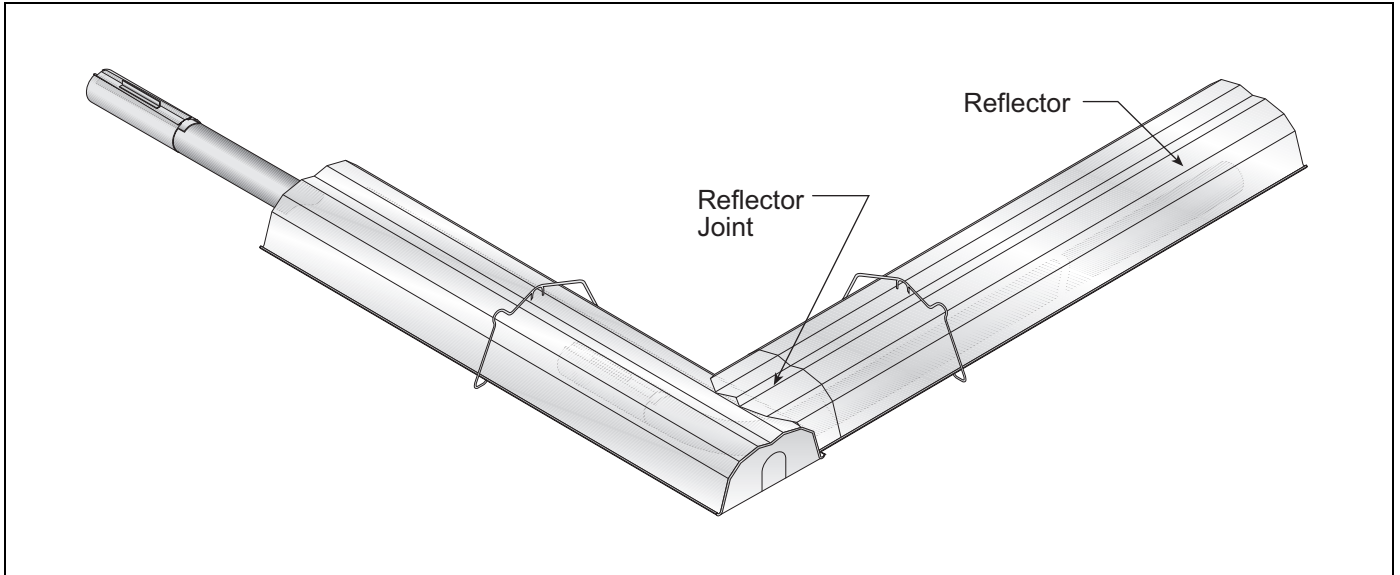
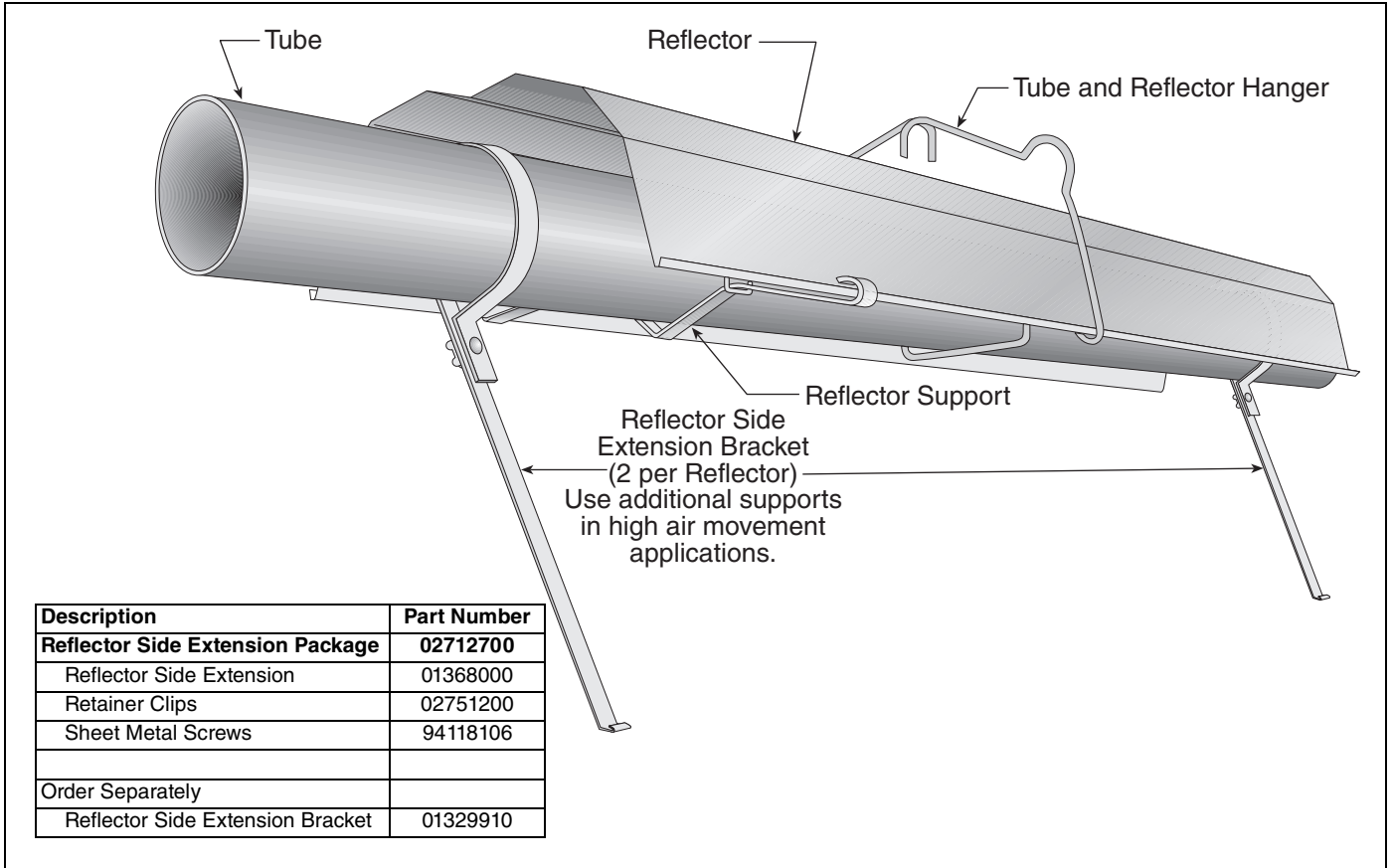


FIGURE 21: Reflector Joint Detail

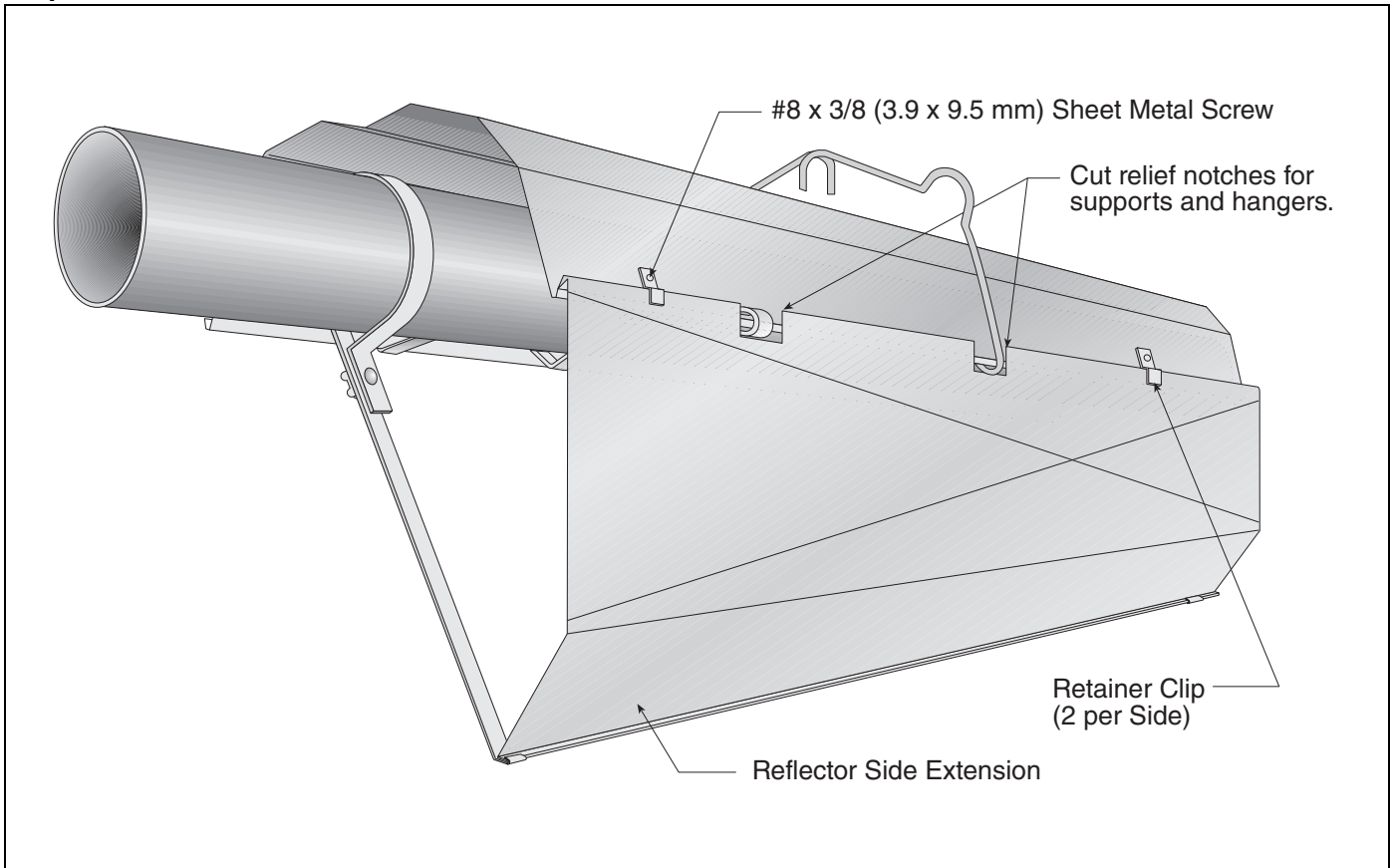


7.3 Reflector Side Extension

Step 7.3.1 Bracket Installation

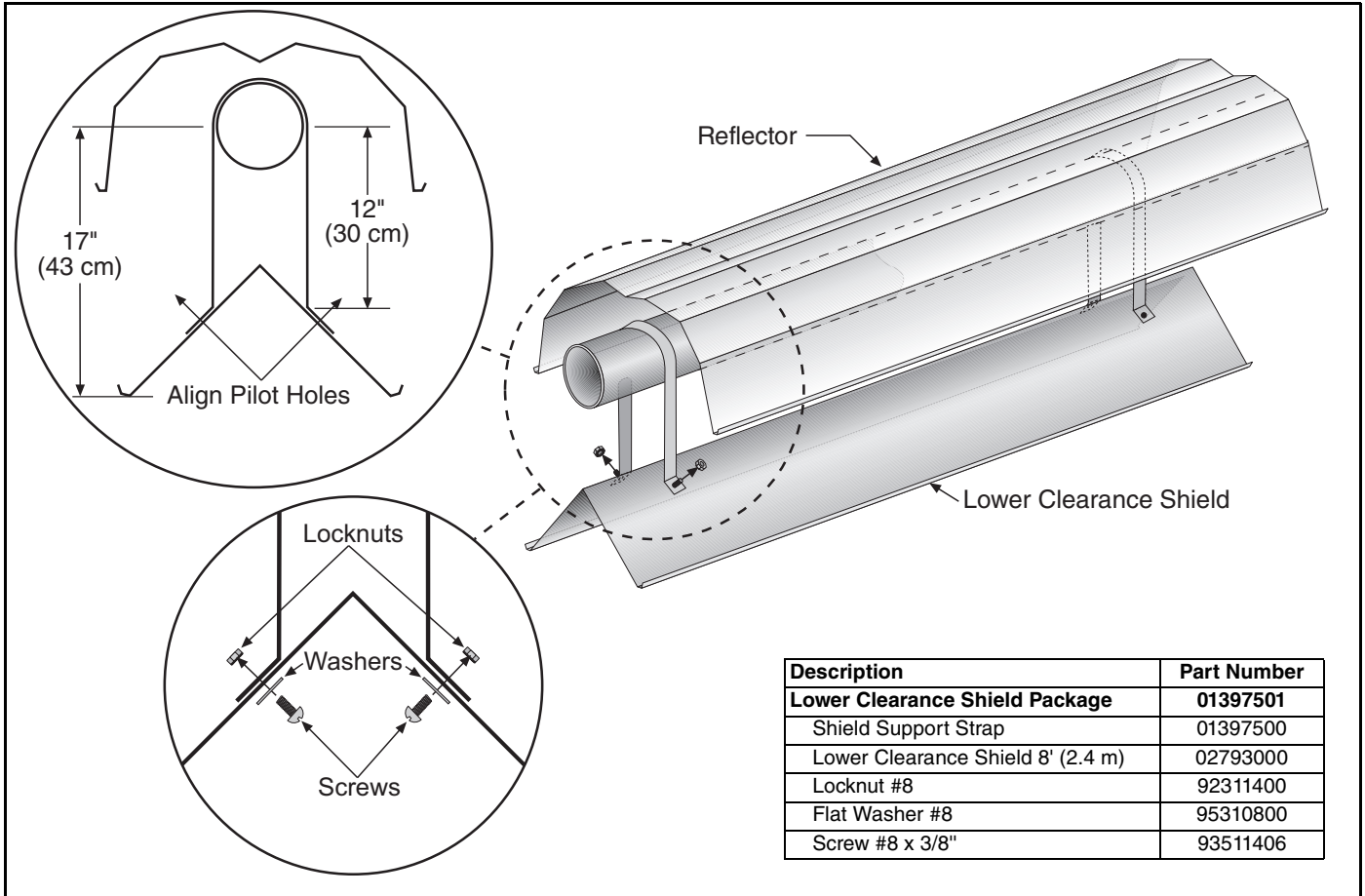


Step 7.3.2 Side Reflector Installation



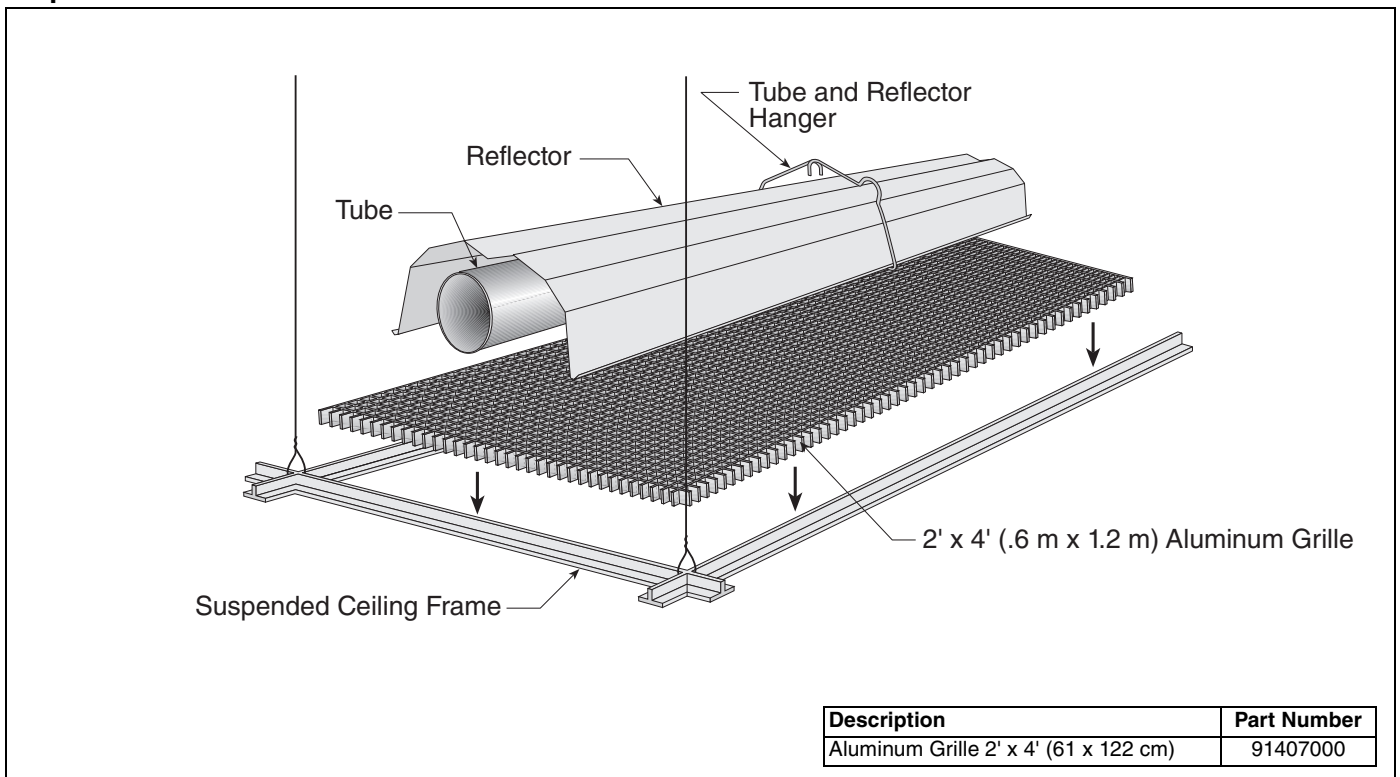
7.4 Lower Clearance Shield Installation

Step 7.4.1 Shield Support Strap Assembly

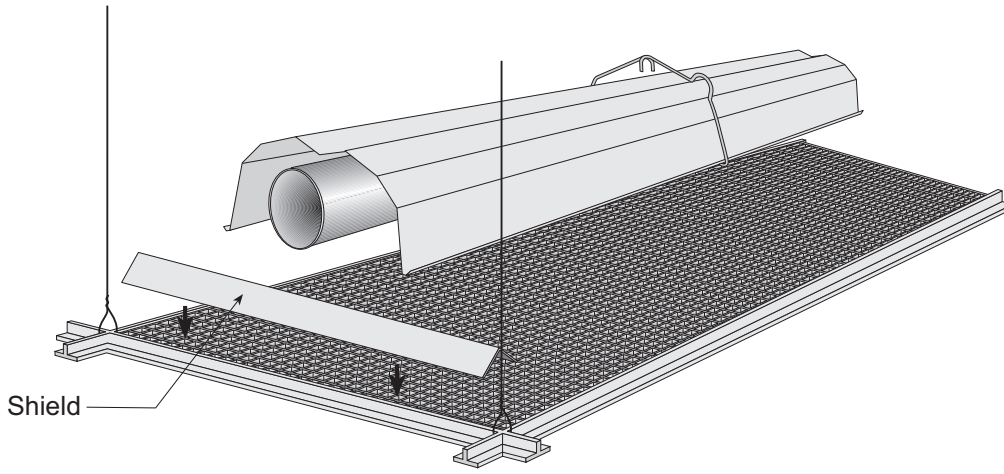


7.5 Two-Foot Decorative Grille Installation

Step 7.5.1 Grille Installation



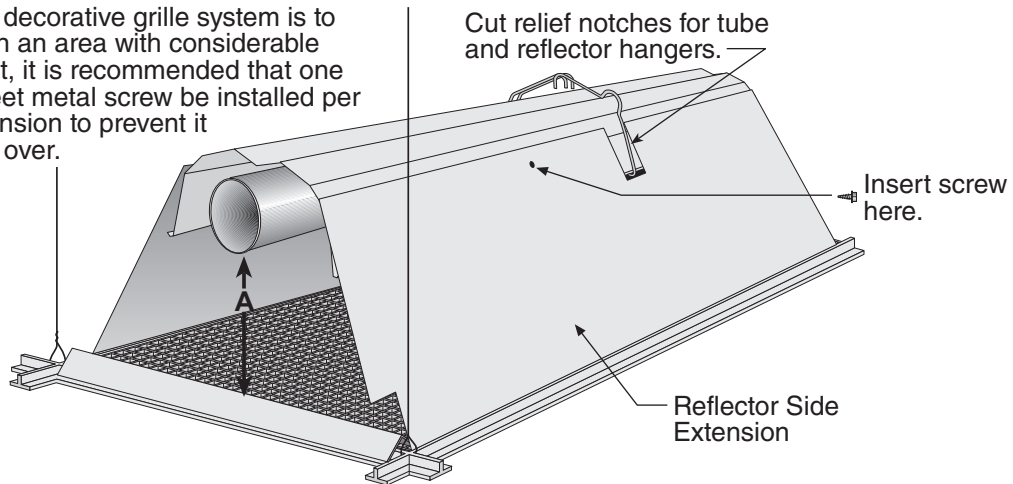
Step 7.5.2 Frame Shield Installation



Description	Part Number
Deco Grille Shield	01365900

Step 7.5.3 Reflector Side Extension Installation for Decorative Grilles

NOTE: If the decorative grille system is to be installed in an area with considerable air movement, it is recommended that one #8 x 3/8" sheet metal screw be installed per reflector extension to prevent it from blowing over.

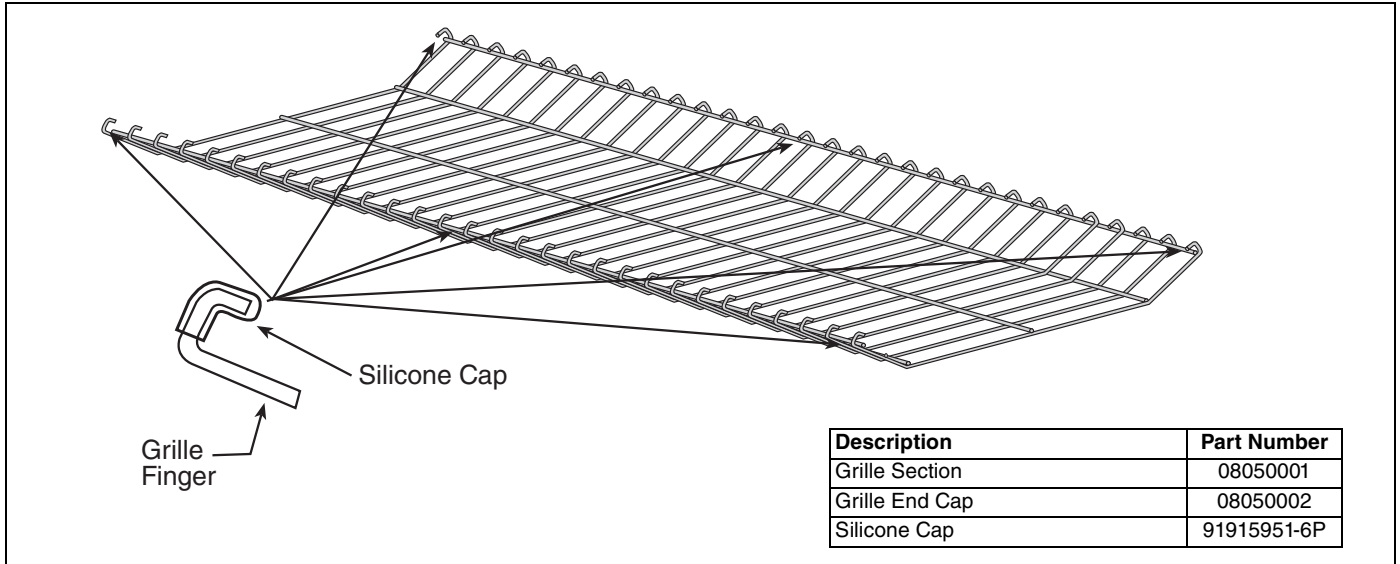


Distance "A"		Extension	
Minimum	Maximum	Part No.	Width
2" (4 cm)	6" (15 cm)	01370408	8" (20 cm)
6" (15 cm)	10" (26 cm)	01370412	12" (30 cm)
10" (26 cm)	14" (37 cm)	01370416	16" (40 cm)

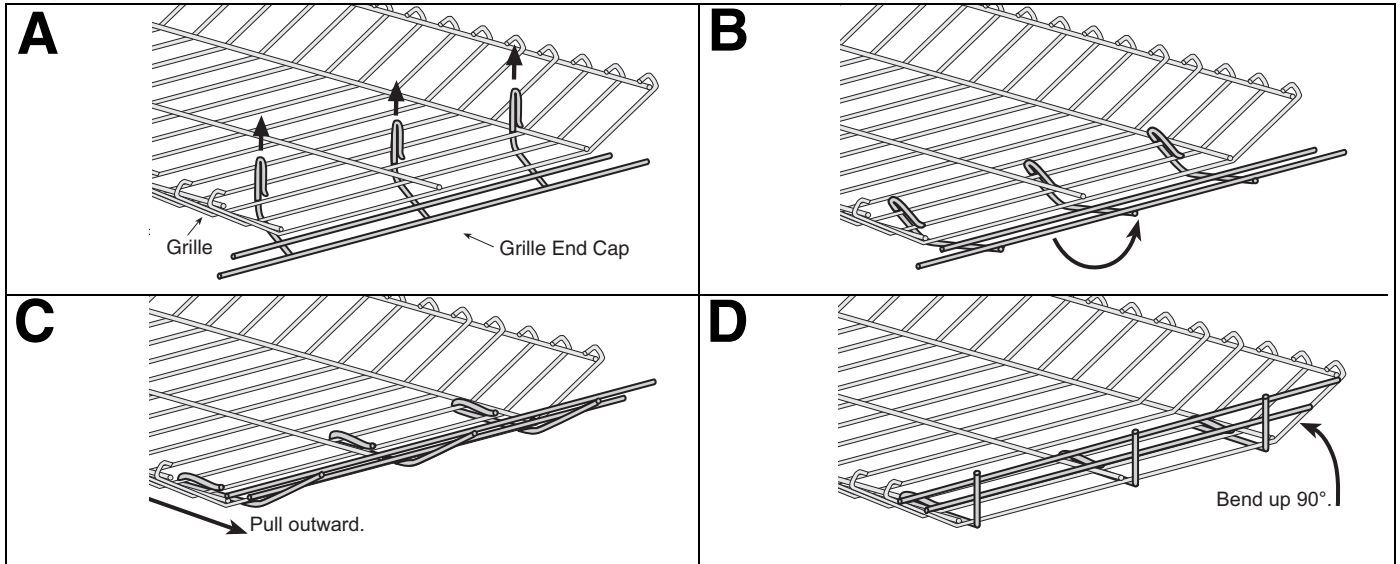
Description	Part Number
Reflector Side Extension	01370412

7.6 Protective Grille Installation

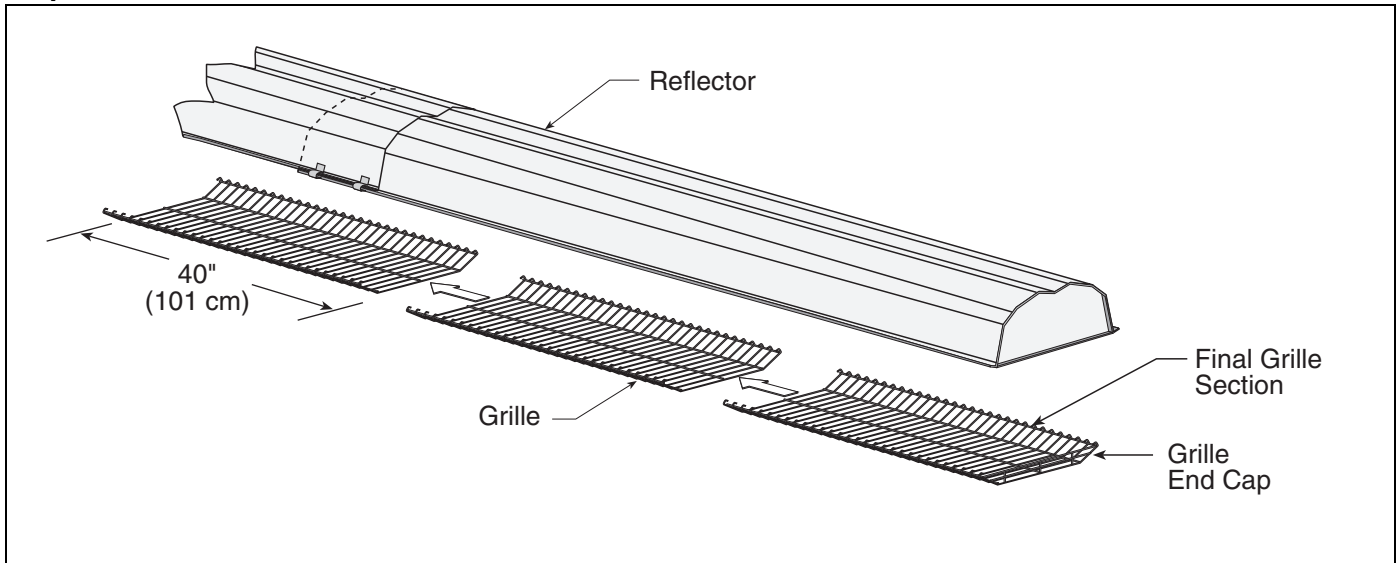
Step 7.6.1 Silicone Cap Installation




Step 7.6.2 Grille End Cap Installation



Step 7.6.3 Grille Installation



SECTION 8: VENTING

! WARNING

Carbon Monoxide Hazard
Heaters installed unvented must be interlocked with sufficient building exhaust.
Heaters must be installed according to the installation manual.
Failure to follow these instructions can result in death or injury.

! WARNING

Cut/Pinch Hazard
Wear protective gear during installation, operation and service.
Edges are sharp.
Failure to follow these instructions can result in injury.

8.1 Venting

This heater must be vented in accordance with the rules contained in this manual and with the following national codes and any state, provincial or local codes which may apply:

United States: Refer to National Fuel Gas Code NFPA 54/ANSI Z223.1 - latest revision.

Canada: Refer to Natural Gas and Propane Installation Code CSA B149.1 - latest revision.

Exhaust end of heater will accept a 4" (10 cm) vent pipe using the vent adapter (P/N 90502700). To prevent leakage of condensation, install the vent adapter with the seam on top and seal the joint using a high temperature silicone sealant.

Any portion of vent pipe passing through a

combustible wall must have an approved thimble to conform with the above listed codes.

Vent pipe must be sloped downward away from the heater 1/2" (1 cm) for every 20' (6 m).

The heater may be individually vented or common vented. When venting horizontally, a maximum of two heaters can be commonly vented. See Page 37, Section 8.9. When venting vertically, a maximum of four heaters can be commonly vented. See Page 38, Section 8.10.

The heater may also be installed unvented in certain circumstances according to building ventilation codes. Refer to the above codes and Page 35, Section 8.2 for further information. Unvented operation also requires compliance with the clearances to combustibles given on Page 8, Figure 12.

The bottom of the vent or air intake terminal shall not be located less than 1' (0.3 m) above grade level.

The vent shall not terminate less than 7' (2.1 m) above grade where located adjacent to public walkways.

Vent terminal must be installed at a height sufficient to prevent blockage by snow, and building materials protected from degradation by flue gases.

Secure all joints with #8 x 3/8 sheet metal screws. Seal all joints with high temperature silicone sealant.

Vent terminal must be beyond any combustible overhang.

8.1.1 United States Requirements

Vent must terminate at least 3' (0.9 m) above any forced air inlet located within 10' (3.1 m).

Vent must terminate at least 4' (1.2 m) below, 4' (1.2 m) horizontally from, or 1' (0.3 m) above any door, operable window, or gravity air inlet into any building.

8.1.2 Canadian Requirements

The vent shall not terminate within 6' (1.8 m) of a mechanical air supply inlet to any building.

The vent shall not terminate within 3' (0.9 m) of a window or door that can be opened in any building, any non-mechanical air supply inlet to any building, or of the combustion air inlet of any other appliance.

8.2 Unvented Operation

Sufficient ventilation must be provided in the amount of 4 cfm per 1000 Btu/h firing rate (United States); 3 cfm per 1000 Btu/h firing rate (Canada). Use of optional outside combustion air is not recommended with unvented heaters.

If exhaust fans are used to supply ventilation air, an interlock switch must be used to prevent the heater from coming on when the fans are off. This may be done using a pressure switch.

⚠ WARNING

Combustion by-products contain a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

8.3 Horizontal Venting

In noncombustible walls only, vent terminal (P/N 02537801-1P) may be used.

For 4" (10 cm) vents in either combustible or noncombustible walls, use Tjernlund VH1-4 (P/N 90502100) or equivalent, insulated vent terminal. Follow the manufacturer's instructions for proper installation.

For 6" (15 cm) common vents in either combustible or noncombustible walls, use Tjernlund VH1-6 (P/N 90502101) or equivalent, insulated vent terminal. Follow the manufacturer's instructions for proper installation.

8.4 Vertical Venting

For 4" (10 cm) common vent, an approved vent cap (P/N 90502300) must be used.

For 6" (15 cm) common vent, an approved vent cap (P/N 90502302) must be used.

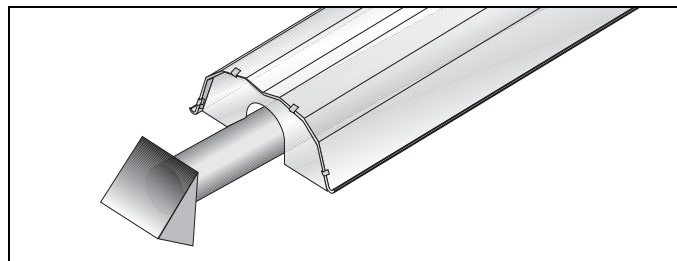
For common vertical venting of more than two heaters, See *Page 38, Section 8.10*.

A vent shall not extend less than 2' (0.6m) above the highest point where it passes through a flat roof of a building.

8.5 Unvented Operation Tube Termination

Turndown type vent terminal with a screen must be installed at the exhaust end of the tube. Vent terminal design shall not incorporate backdraft flap.

FIGURE 22: Tube Termination



8.6 Length Requirements

The maximum vent length allowed is 45' (13.7 m). The maximum outside air supply duct length allowed is 45' (13.7 m).

The total vent length, plus outside air duct length, plus any extensions to minimum heat exchanger lengths, cannot exceed 65' (19.8 m).

Vent length should be limited to less than 20' (6 m). If using vent lengths greater than 20' (6 m), condensation will form in the vent pipe. Insulation and additional sealing measures (high temperature silicone at all seams) are required. Optional heat exchanger beyond minimum lengths is considered as vent length for length determination.

Subtract 15' (4.6 m) of maximum allowed vent or duct length per vent elbow if more than two are used.

8.7 Horizontal Ventilation 4" (10 cm) Pipe

Combustible or Non-Combustible Wall

Non-Combustible Wall Only

Description	Part Number
Vent Terminal (Comb. Wall)	90502100
Vent Terminal	02537801-XX
Wall Thimble 4" (10 cm)	90505600

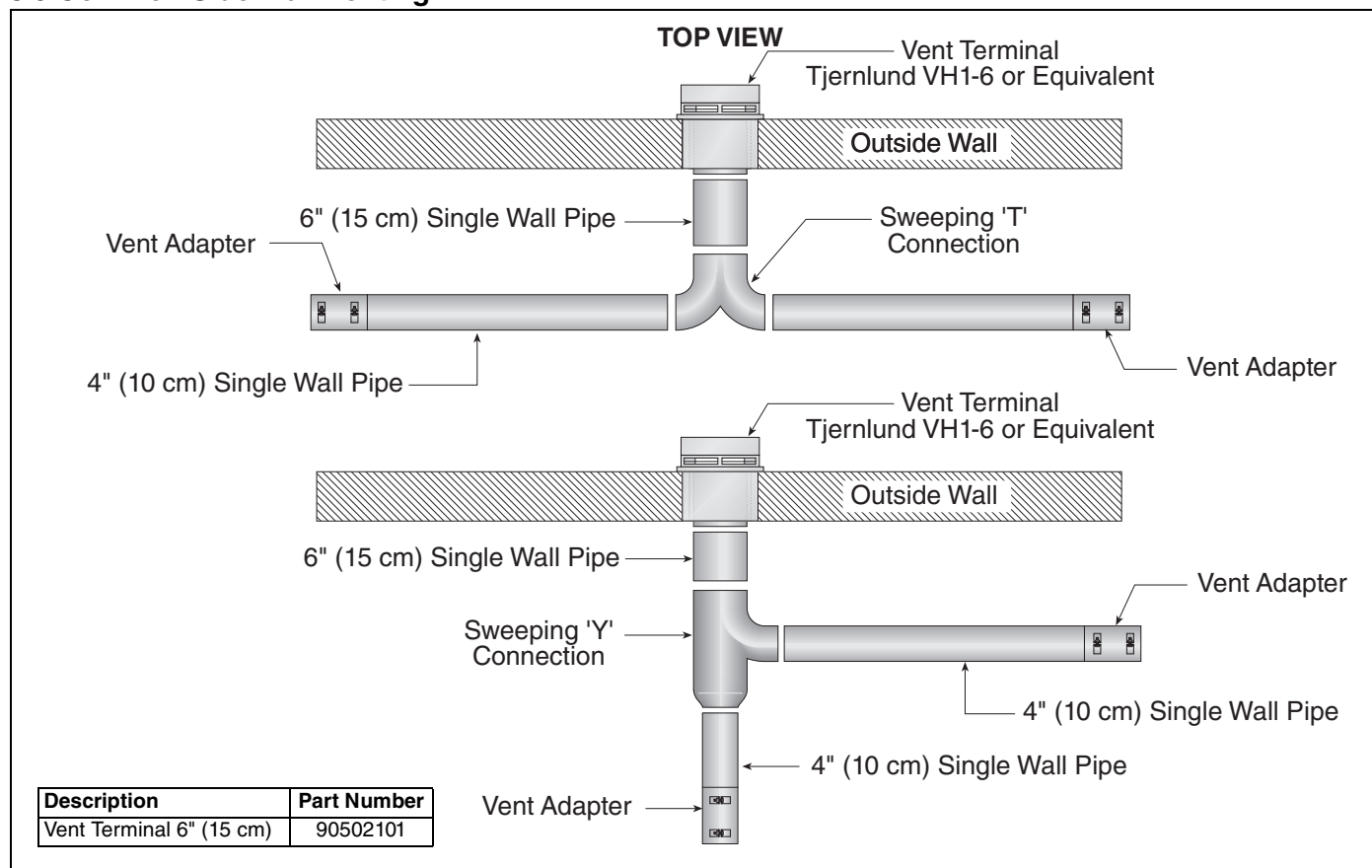
8.8 Vertical Ventilation 4" (10 cm) Pipe

SIDE VIEW

The last section of vent pipe passing through the roof or wall may be Type "B" vent pipe. All other vent materials in the building must be single wall vent pipe.

Description	Part Number
Vent Cap 4" (10 cm)	90502300

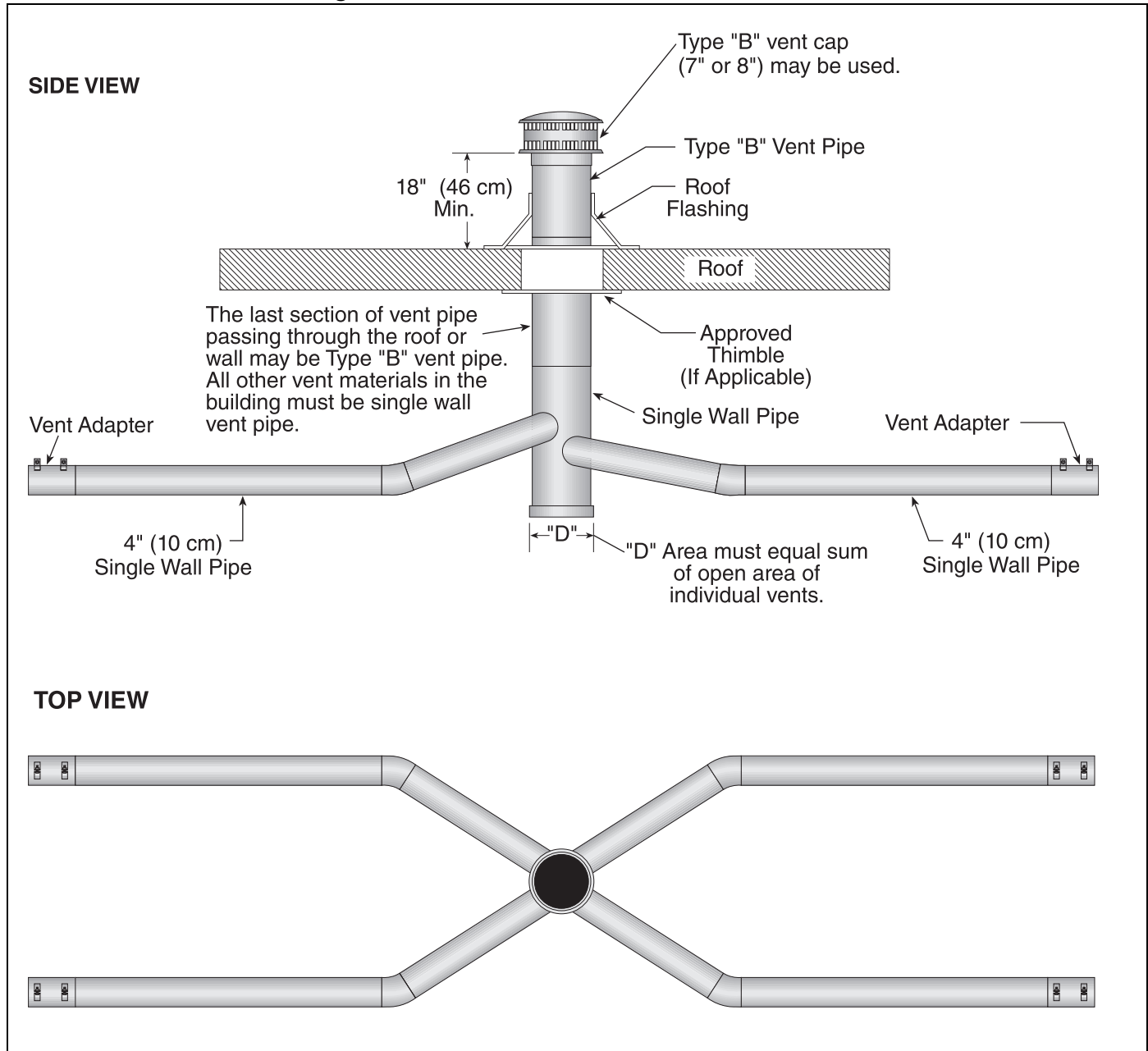
8.9 Common Side Wall Venting



Requirements:

- Maximum of two heaters can be commonly vented through a side wall.
- Heaters must be of the same BTU output.
- Heaters must be controlled by a common thermostat.

8.10 Common Vertical Venting



Requirements:

- Maximum of four heaters can be commonly vented through the roof.
- Heaters must be of the same BTU output.
- Heaters must be controlled by a common thermostat.
- Connections to a common stack must be positioned to avoid direct opposition between streams of combustion gases.

8.11 Outside Combustion Air Supply

IMPORTANT: If the building has a slight negative pressure or corrosive contaminants, such as halogenated hydrocarbons, are present in the air, an outside combustion air supply to the heater is required. Seal all combustion air pipe joints.

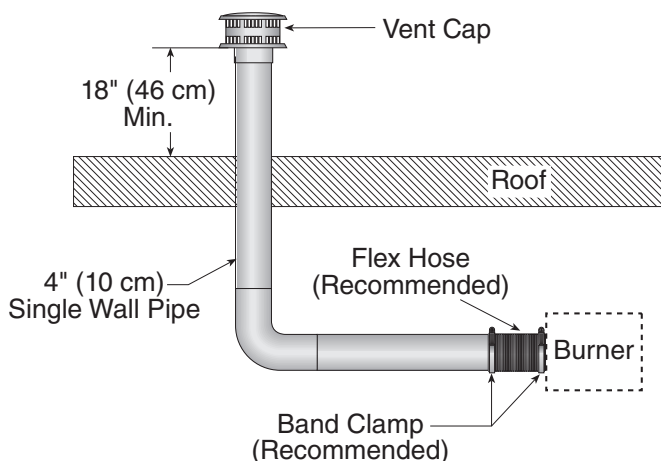
Use of optional outside combustion air is not recommended with unvented heaters.

The air supply duct may have to be insulated to prevent condensation on the outer surface. The outside air terminal must not be more than 1' (31 cm) above the vent terminal.

8.11.1 Length Requirements

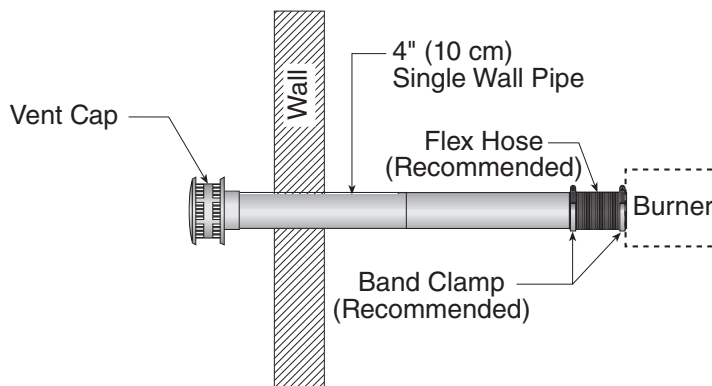
Follow the constraints listed on *Page 35, Section 8.6.*

8.11.2 Vertical Outside Air Supply for Single Heater Installation



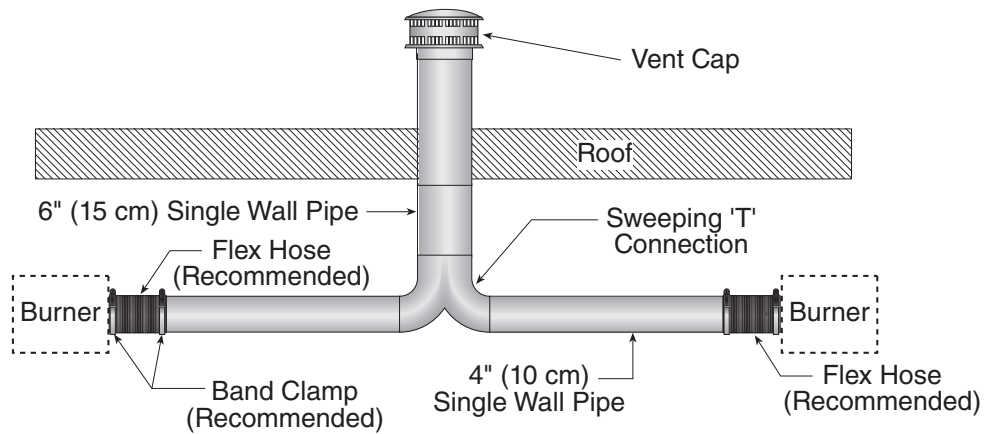
Description	Part Number
Vent Cap 4" (10 cm)	90502300

8.11.3 Horizontal Outside Air Supply for Single Heater Installation



Description	Part Number
Vent Cap 4" (10 cm)	90502300

8.11.4 Vertical Outside Air Supply for Double Heater Installation

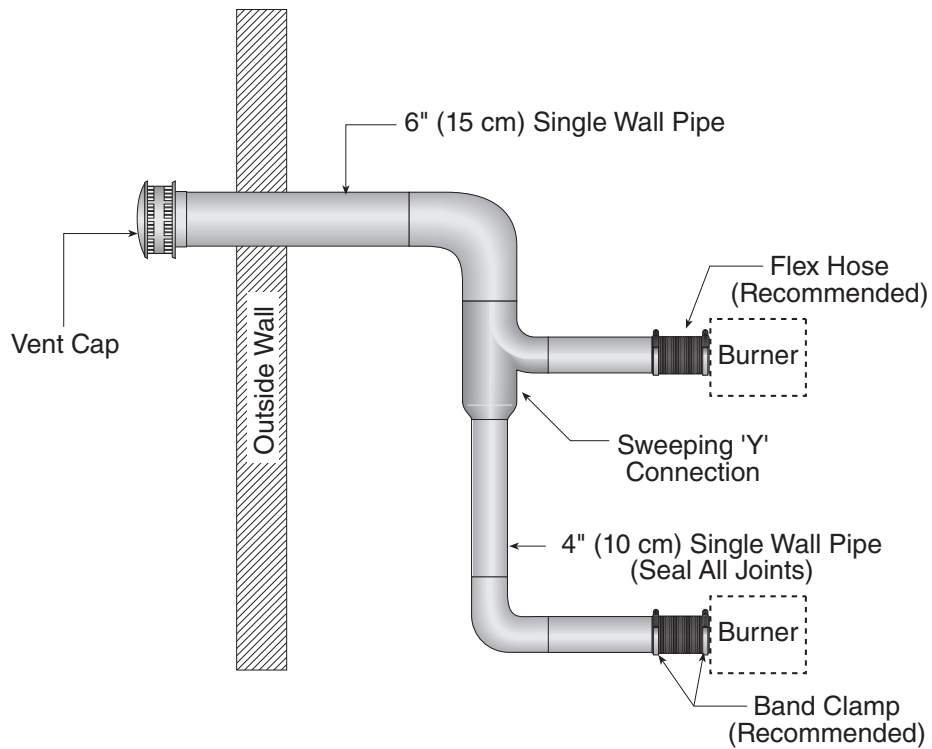


Description	Part Number
Vent Cap 6" (15 cm)	90502302

Requirements:

- Heaters must be controlled by a common thermostat.

8.11.5 Horizontal Outside Air Supply for Double Heater Installation



Description	Part Number
Vent Cap 6" (15 cm)	90502302

Requirements:

- Heaters must be controlled by a common thermostat.

SECTION 9: GAS PIPING

⚠ WARNING**Fire Hazard**

Tighten gas hose fittings to connect gas supply according to Figure 23.

Gas hose can crack when twisted.

Gas hose moves during normal operation.

Use only 36" (91 cm) long connector of 1/2" or 3/4" nominal ID.

Connector supplied with heater for U.S. models (not with Canadian models).

Failure to follow these instructions can result in death, injury or property damage.

⚠ WARNING**Explosion Hazard**

Leak test all components of gas piping before operation.

Gas can leak if piping is not installed properly.

Do not high pressure test gas piping with burner connected.

Failure to follow these instructions can result in death, injury or property damage.

Install the gas hose as shown in *Figure 23*. The gas hose accommodates expansion of the heating system and allows for easy installation and service of the burner. Before connecting the burners to the supply system, verify that all high pressure testing of the gas piping has been completed.

There is an expansion of the tube with each firing cycle; this will cause the burner to move with respect to the gas hose. This can cause a gas leak resulting in an unsafe condition if the gas connection is not made strictly in accordance with *Figure 23*.

Meter and service must be large enough to handle all the burners being installed plus any other connected load. The gas hose which feeds the system must be large enough to supply the required gas with a maximum pressure drop of 1/2" w.c. When gas piping is not included in the layout drawing, the local gas supplier will usually help in planning the gas piping.

Gas lines must meet applicable codes:

United States: The Flexible Stainless Steel Gas Hose (US models) supplied with the heater is certified per the Standard for Connectors for Gas Appliances, ANSI Z21.24/CSA 6.10 - latest revision.

Canada: The Rubber Type 1 Gas Hose (Canadian models) optional with the heater is certified as being in compliance with the Standard for Elastomeric Composite Hose and Hose Couplings for Conducting Propane and Natural Gas, CAN/CGA 8.1 - Latest revision.

- **Check the pipe and tubing ends for leaks before placing heating equipment into service. When checking for gas leaks, use a soap and water solution; never use an open flame.**

FIGURE 23: Gas Connection with Flexible Gas Hose

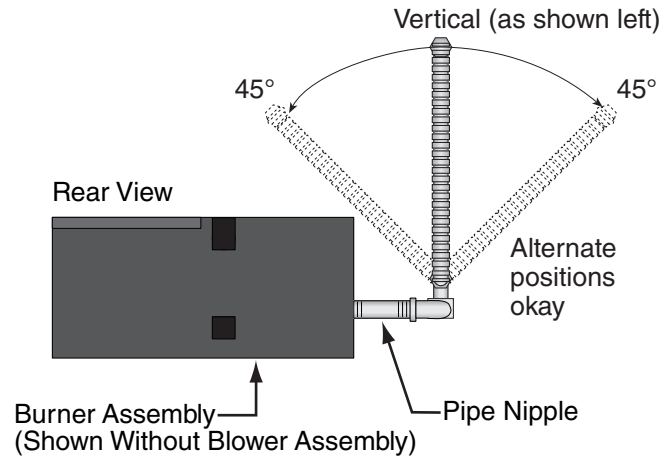
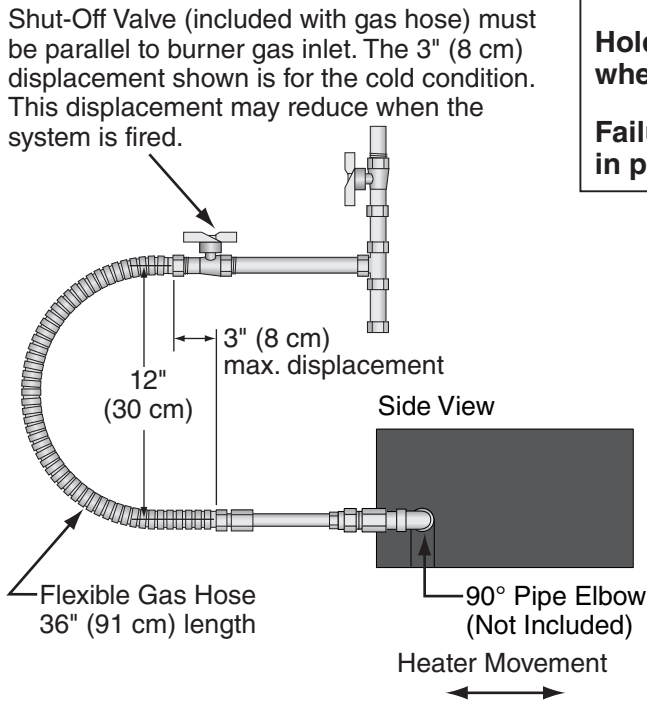
CORRECT POSITIONS

⚠ CAUTION

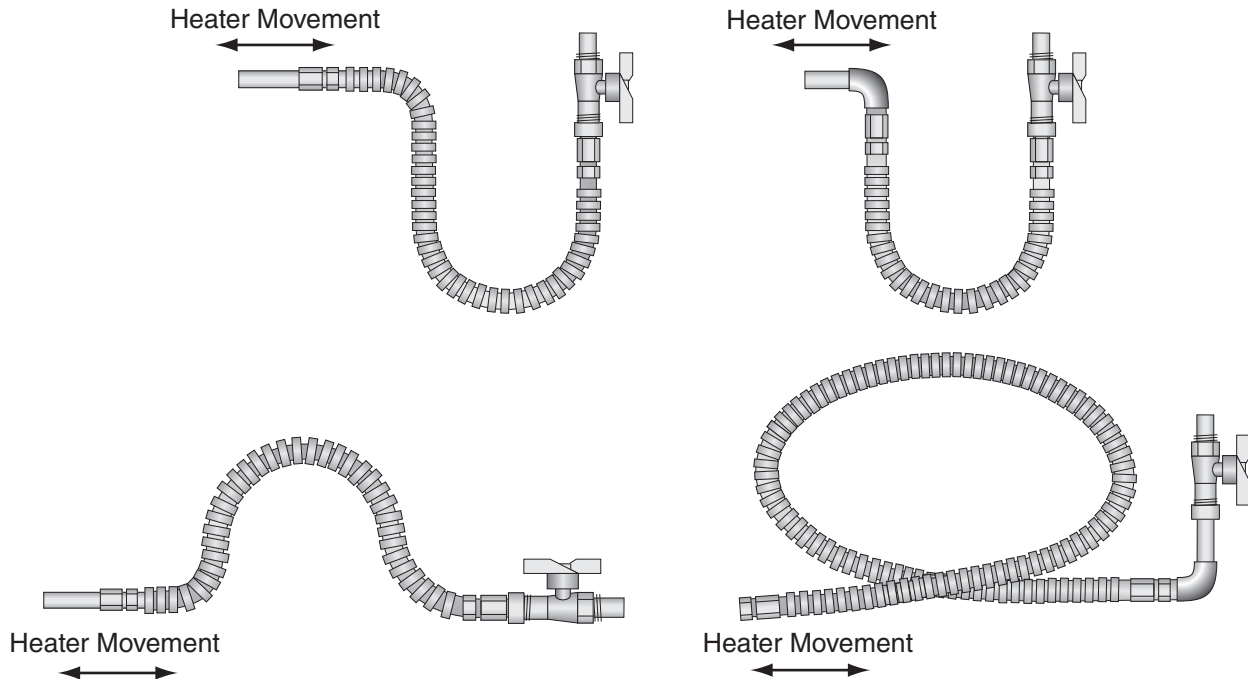
Product Damage Hazard

Hold gas nipple securely with pipe wrench when attaching gas hose.

Failure to follow these instructions can result in product damage.




INCORRECT POSITIONS (WRONG INSTALLATION)



Description	Part Number
1/2" Flexible Stainless Steel Gas Hose (US Models)	91412200
3/4" Flexible Stainless Steel Gas Hose (US Models)	91412204
1/2" Rubber Type 1 Gas Hose (Canadian Models)	91412206
3/4" Rubber Type 1 Gas Hose (Canadian Models)	91412207

SECTION 10: WIRING

⚠ DANGER



Electrical Shock Hazard

Disconnect electric before service or maintenance.

Heater must be connected to a properly grounded electrical source.

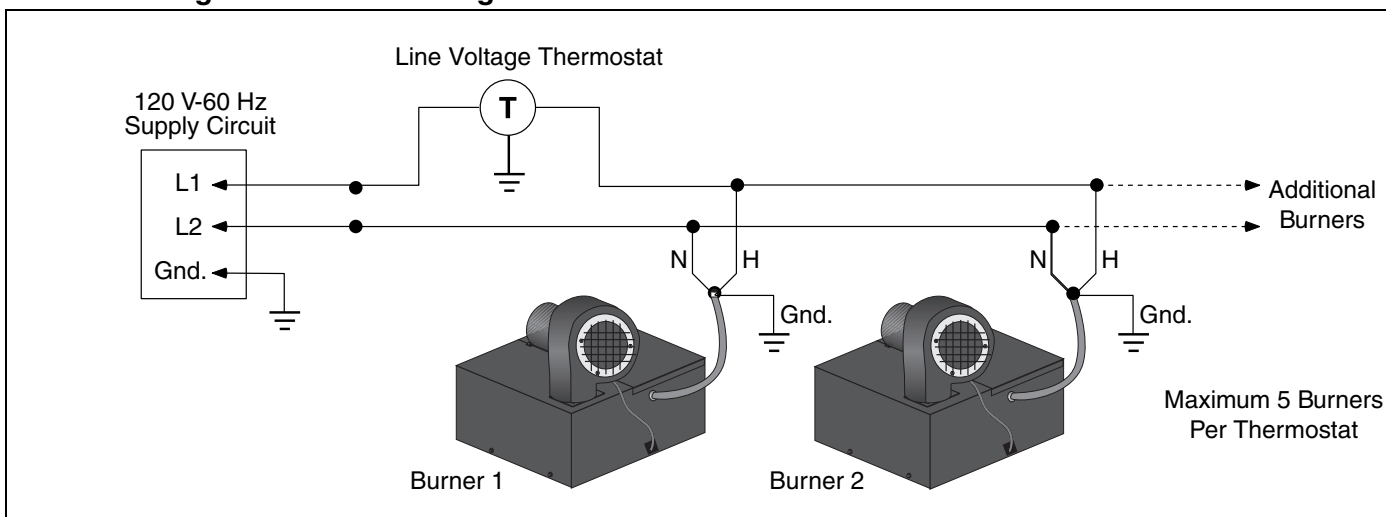
Failure to follow these instructions can result in death or electrical shock.

Heaters can be controlled using several methods. Normally thermostats are used to control the heaters but they can also be controlled by an energy management system. *Section 10.1* illustrates the connection for heaters controlled by a line voltage thermostat.

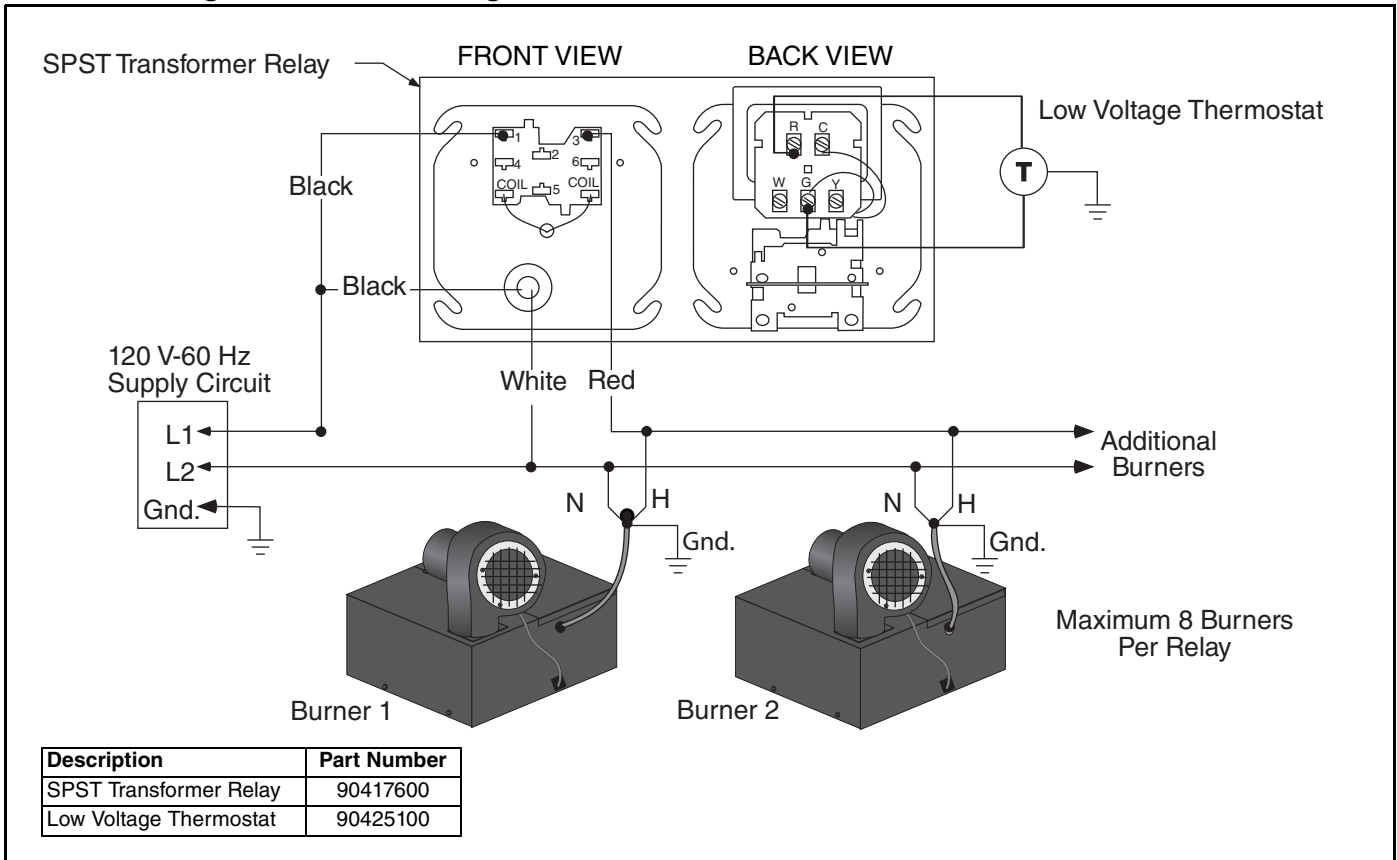
For heaters on a low voltage thermostat, See *Page 44, Section 10.2*. Heaters must be grounded in accordance with applicable codes: United States: Refer to National Electrical Code® NFPA 70 - latest revision; Canada: Refer to Canadian Electrical Code CSA C22.1 Part I - latest revision.

If any of the original internal wiring must be replaced, it must be replaced with wiring materials having a temperature rating of at least 105°C and 600 volts.

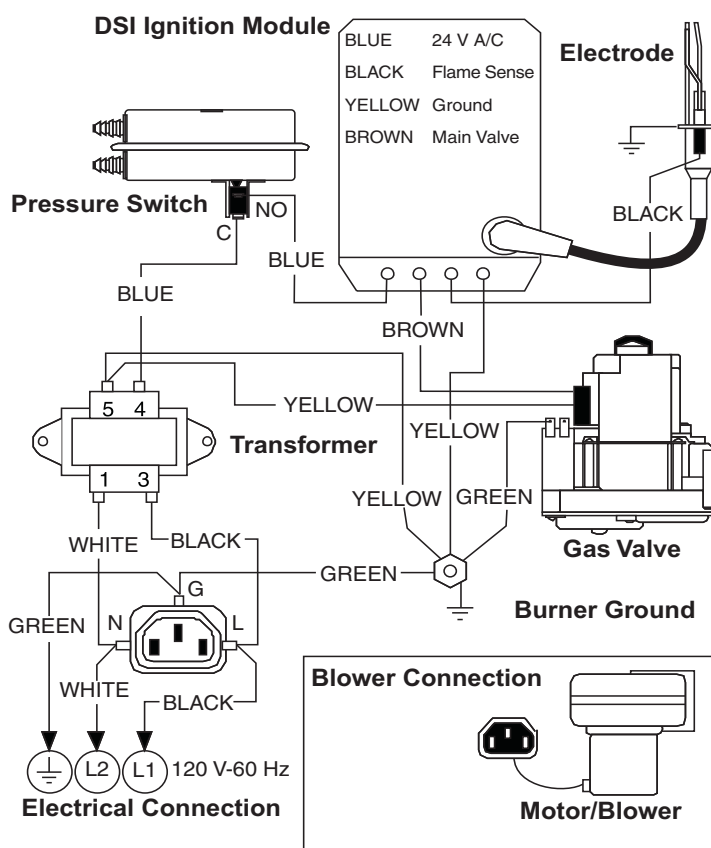
10.1 Line Voltage Thermostat Wiring



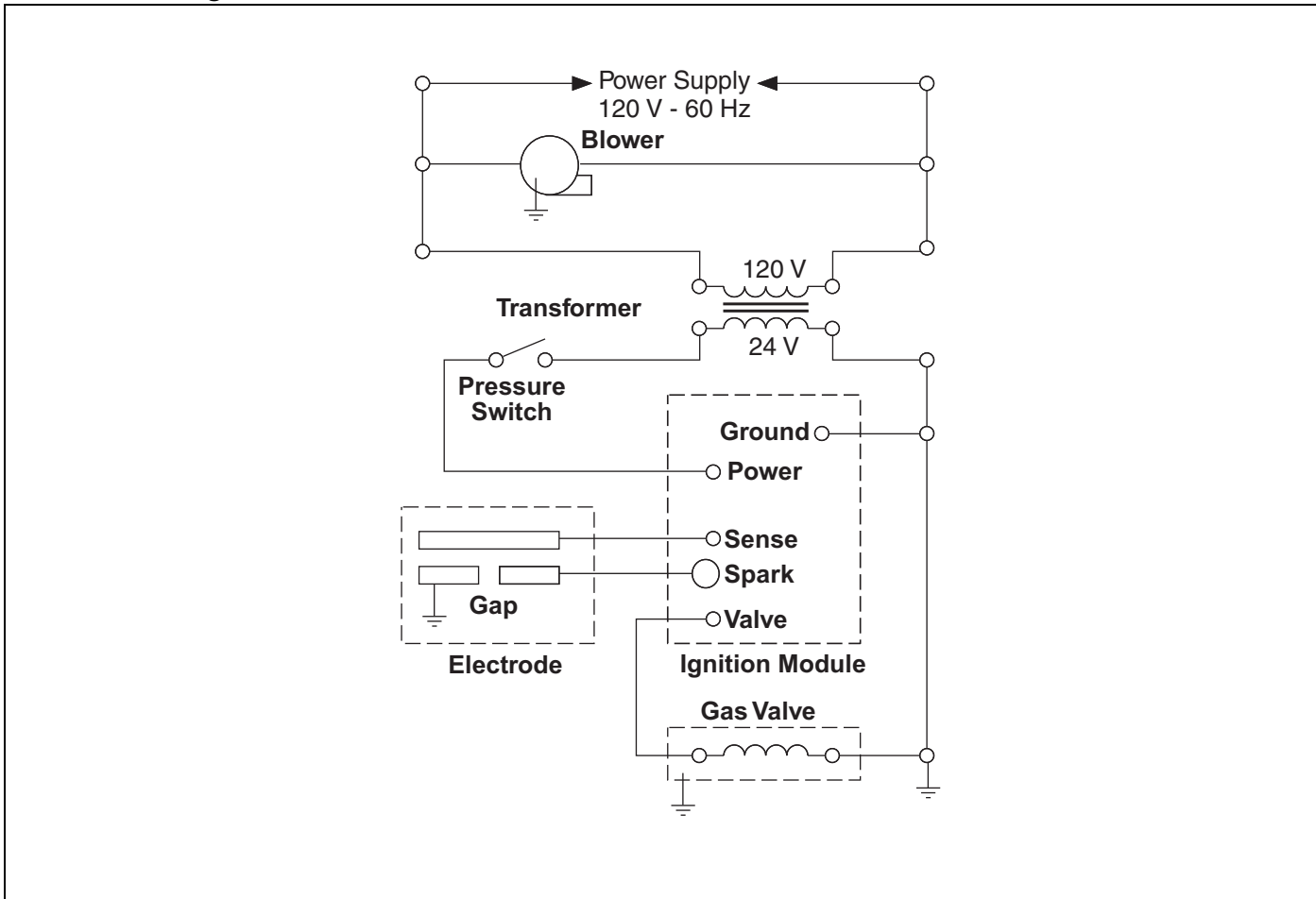
10.2 Low Voltage Thermostat Wiring



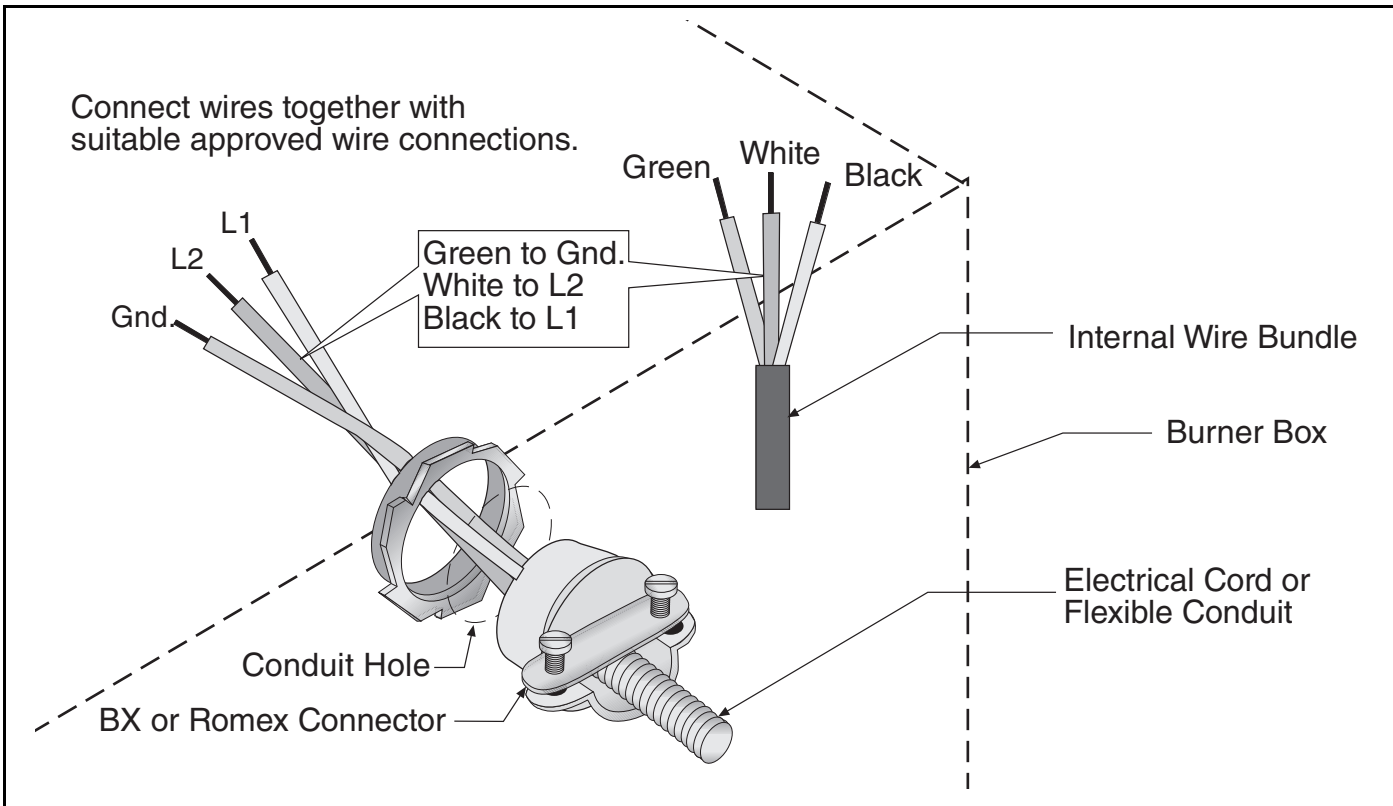
10.3 Internal Wiring



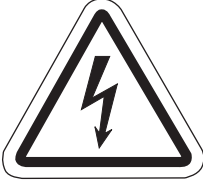



10.4 Ladder Diagram



10.5 Electrical Connection to the Burner



SECTION 11: OPERATION AND MAINTENANCE

⚠ DANGER		⚠ WARNING	
			
Electrical Shock Hazard Disconnect electric before service or maintenance. Heater must be connected to a properly grounded electrical source.	Explosion Hazard Turn off gas supply to heater before service or maintenance.	Burn Hazard Allow heater to cool before service or maintenance. Tubing may still be hot after operation.	Cut/Pinch Hazard Wear protective gear during installation, operation and service. Edges are sharp.
Failure to follow these instructions can result in death, electric shock, injury or property damage.			

This heater is equipped with a direct spark ignition system.

11.1 Sequence of Operation

1. Turn the thermostat up. When the thermostat calls for heat, the blower motor will energize.
2. When the motor approaches nominal running RPM, the pressure switch closes and activates the ignition module.
3. After a 45 second prepurge, the ignition module then opens the gas valve and energizes the spark igniter.
4. When the flame is established, the sparking sequence ceases.
5. If the flame is not established during the ignition sequence, the ignition module closes the gas valve and purge begins. Module will try 2 additional times for ignition (with purges in between trials). If ignition is not established, the module will lockout.
6. If the flame extinguishes during operation, the ignition module will attempt the multiple trial sequence described in step 5. If ignition is not re-established, the module will lockout for one hour or until reset.
7. After lockout, the control can be reset by turning down thermostat for five seconds, and then

raising it again to desired temperature, or by disconnecting power and then reconnecting.

8. When thermostat is satisfied, all power to the unit is shut off.

11.2 To Shut Off Heater

Set thermostat to lowest setting.
Turn OFF electric power to heater.
Turn OFF manual gas valve in the heater supply line.

11.3 To Start Heater

Turn gas valve and electric power OFF and wait five minutes for unburned gases to vent from heater.
Turn ON main gas valve.
Turn ON electric power.
Set thermostat to desired temperature.
Burner should light automatically.

11.4 Pre-Season Maintenance and Annual Inspection

To ensure your safety and years of trouble-free operation of the heating system, service and annual inspections must be done by a contractor qualified in the installation and service of gas-fired heating equipment.

Turn off gas and electric supplies before performing service or maintenance. Allow heater to cool before servicing.

Before every heating season, a contractor qualified in the installation and service of gas-fired heating equipment must perform a thorough safety inspection of the heater.

For best performance, the gas, electrical, thermostat connections, tubing, venting, suspensions and overall heater condition should be inspected thoroughly.

NOTE: Gas flow and burner ignition are among the first things that should be inspected.

Please see *Page 49, Section 11.5* for suggested items to inspect.

11.5 Maintenance Checklist

Installation Code and Annual Inspections:

All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment.

To help facilitate optimum performance and safety, Roberts-Gordon recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon.

The Vicinity of the Heater	<p>Do not store or use flammable objects, liquids or vapors near the heater. Immediately remove these items if they are present.</p> <p><i>See Page 4, Section 3.</i></p>
Vehicles and Other Objects	<p>Maintain the clearances to combustibles.</p> <p>Do not hang anything from, or place anything on, the heater.</p> <p>Make sure nothing is lodged underneath the reflector, in between the tubes or in the decorative or protective grilles (included with select models).</p> <p>Immediately remove objects in violation of the clearances to combustibles.</p> <p><i>See Page 4, Section 3.</i></p>
Reflector	<p>Support reflector with reflector hanger and support strap.</p> <p>Reflector must not touch tube.</p> <p>Make sure there is no dirt, sagging, cracking or distortion.</p> <p>Do not operate if there is sagging, cracking or distortion.</p> <p>Make sure reflectors are correctly overlapped. <i>See Page 22, Section 6.5.1.</i></p> <p>Clean outside surface with a damp cloth.</p>
Vent Pipe	<p>Venting must be intact. Using a flashlight, look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion.</p> <p>The area must be free of dirt and dust.</p> <p>Remove any carbon deposits or scale using a wire brush.</p> <p><i>See Page 34, Section 8.</i></p>
Outside Air Inlet	<p>Inlet must be intact. Look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion.</p> <p>The area must be free of dirt and dust. Clean and reinstall as required.</p>
Tubes	<p>Make sure there are no cracks.</p> <p>Make sure tubes are connected and suspended securely.</p> <p><i>See Page 13, Section 6.</i></p> <p>Make sure there is no sagging, bending or distortion.</p> <p>Clean or replace as required.</p>
Gas Line	<p>Check for gas leaks. <i>See Page 41, Section 9.</i></p>
Burner Observation Window	<p>Make sure it is clean and free of cracks or holes.</p> <p>Clean and replace as required.</p>
Blower Scroll, Wheel and Motor	<p>Compressed air or a vacuum cleaner may be used to clean dust and dirt.</p>

Burner Cup and Orifice	Clear of obstructions (even spider webs will cause problems). Carefully remove any dust and debris from the burner.
Electrode	Replace if there are cracked ceramics, excessive carbon residue, or erosion of the electrode. The electrode gap should be 1/8" (3.2 mm).
Thermostat	There should be no exposed wire or damage to the thermostat. <i>See Page 43, Section 10.</i>
Suspension Points	Make sure the heater is hanging securely. Look for signs of wear on the chain or ceiling. <i>See Page 14, Figure 14.</i>
Decorative and Protective Grille (optional)	The grille must be securely attached. Check that the side reflector extensions are installed correctly and secured in place if necessary. (Decorative grille only.) <i>See Page 31, Section 7.5 and Page 33, Section 7.6</i> Make sure shield is installed correctly and secured in place if necessary. (Decorative grille only.) <i>See Page 32, Section 7.5.2.</i>
Lower Clearance Shield (optional)	The lower shield must be securely attached. Inspect shield support straps and lower clearance shield anchor points. <i>See Page 31, Section 7.4.</i> Make sure shield is installed correctly and secured in place if necessary. <i>See Page 31, Section 7.4.</i>
Wall Tag	If wall tag is present, make sure it is legible and accurate. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor, if you need a wall tag. <i>See Page 3, Section 2.1</i>

SECTION 12: TROUBLESHOOTING

⚠ DANGER**Electrical Shock Hazard**

Disconnect electric before service or maintenance.

Heater must be connected to a properly grounded electrical source.

Failure to follow these instructions can result in death or electrical shock.

⚠ WARNING**Fire Hazard**

Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater.

Some objects will catch fire or explode when placed close to heater.

**Explosion Hazard**

Turn off gas supply to heater before service or maintenance.

**Burn Hazard**

Allow heater to cool before service or maintenance.

Tubing may still be hot after operation.

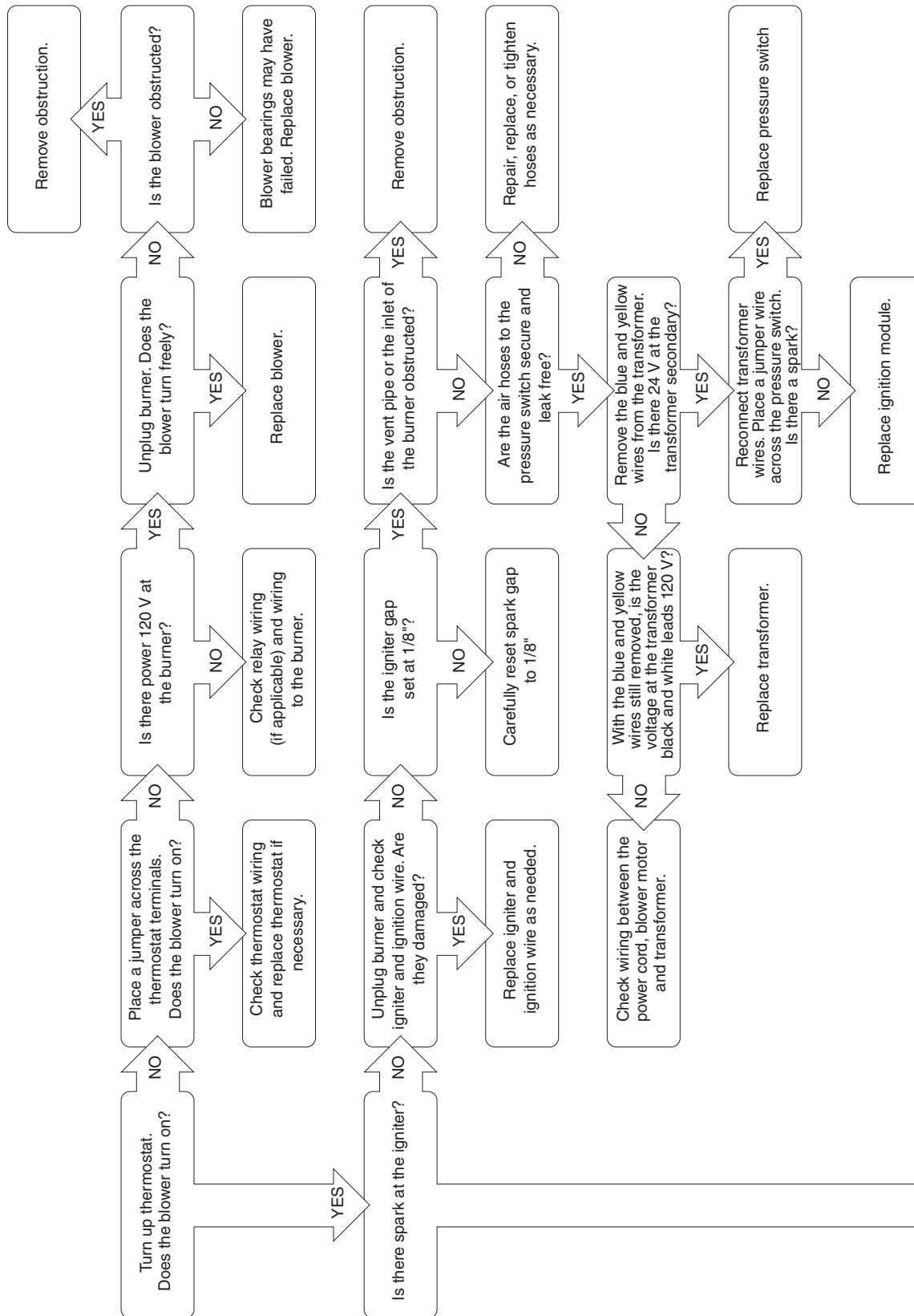
**Cut/Pinch Hazard**

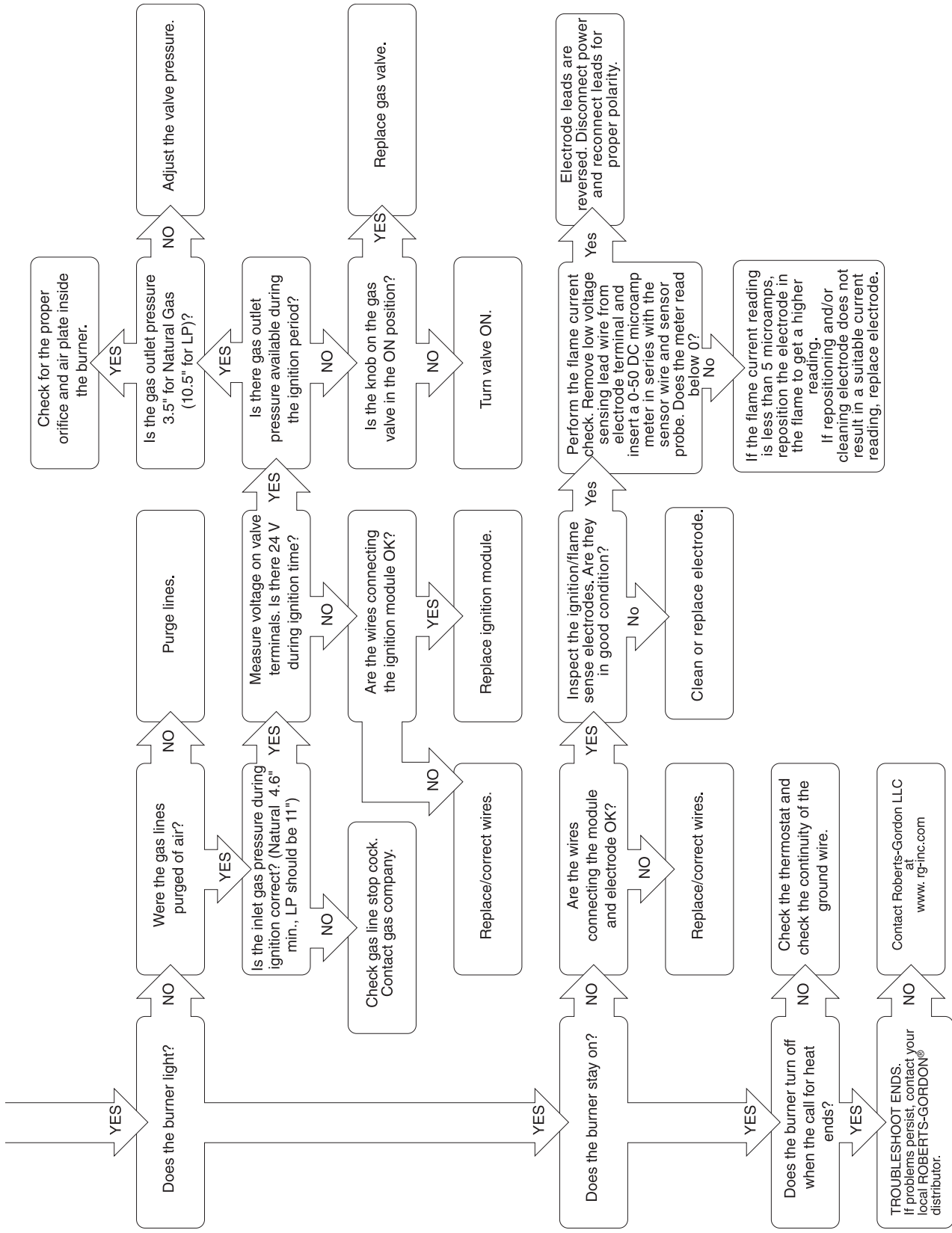
Wear protective gear during installation, operation and service.

Edges are sharp.

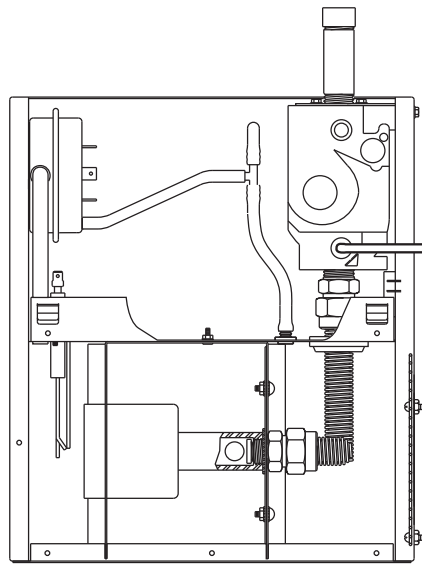
Failure to follow these instructions can result in death, injury or property damage.

12.1 Troubleshooting Flow Chart



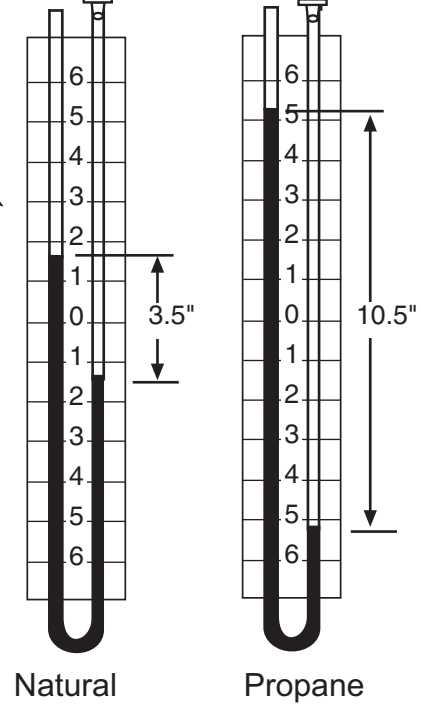


12.2 Manifold Gas Pressure Setting

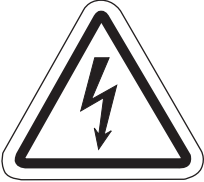





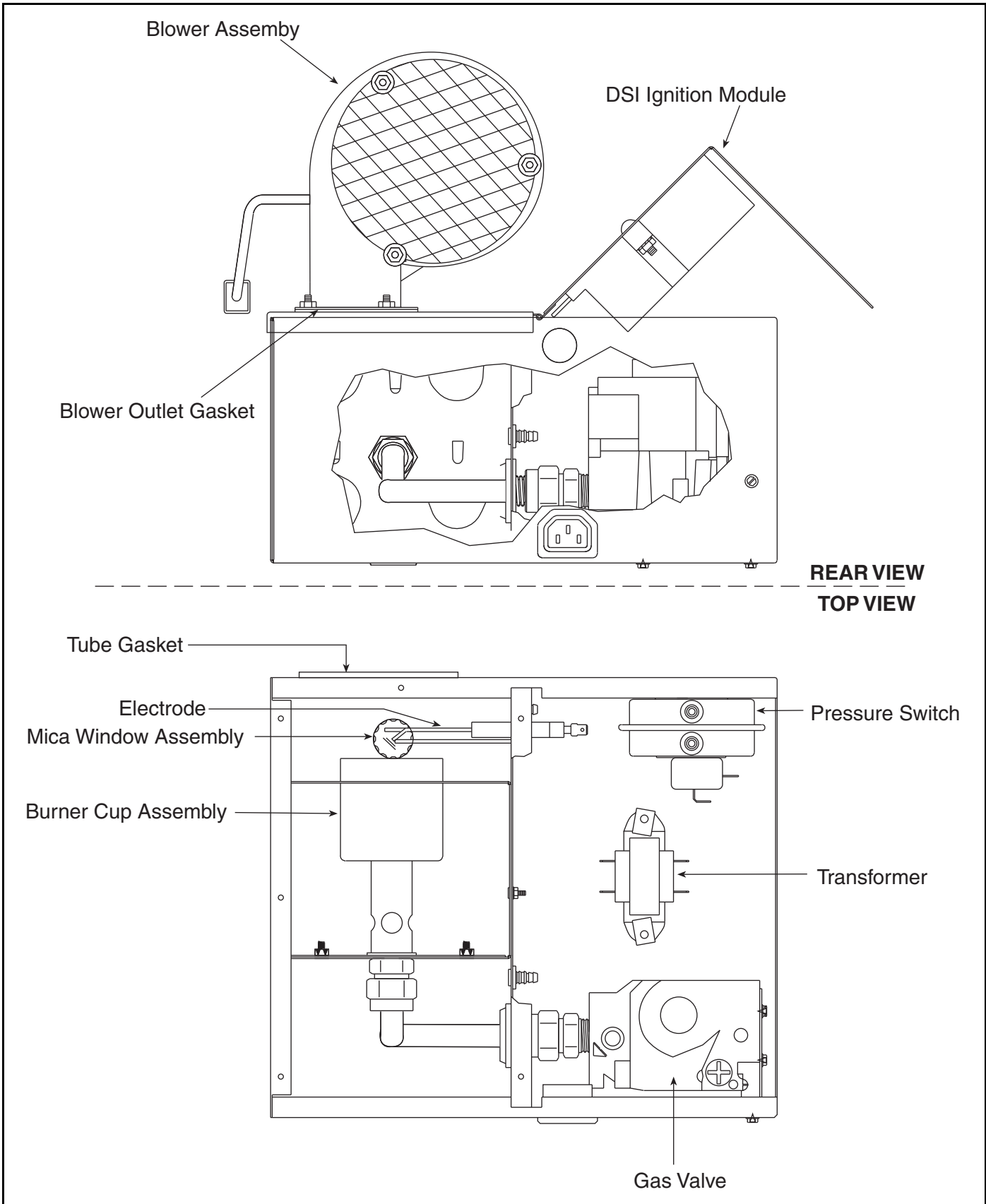
Top View of Heater

Manometer



SECTION 13: REPLACEMENT PARTS

⚠ DANGER	⚠ WARNING		
			
Electrical Shock Hazard	Explosion Hazard	Fire Hazard	Carbon Monoxide Hazard
<p>Use only genuine ROBERTS GORDON® replacement parts per this installation, operation and service manual.</p>			
<p>Failure to follow these instructions can result in death, electric shock, injury or property damage.</p>			



Description	Part Number
Mica Window Assembly	02553203
Electrode Gasket	02558501
Tube Gasket	02568200
Burner Cup Assembly	03020100
Gas Valve (Natural)	90032500
Gas Valve (LP)	90032502
Electrode	90427400
DSI Ignition Module	90439500K
Transformer	90436900K
Pressure Switch	
(200)	90439801K
(115, 140, 175)	90439802K
(150)	90439803K
(60, 80, 100, 125)	90439805K
(40)	90439808K
Motor/Blower Assembly	90709700-P
Blower Outlet Gasket	90709801

SECTION 14: GENERAL SPECIFICATIONS

14.1 Material Specifications

14.1.1 Reflectors

.024 Aluminum
(Optional .024 Stainless Steel Type 304)

14.2 Heater Specifications

14.2.1 Ignition

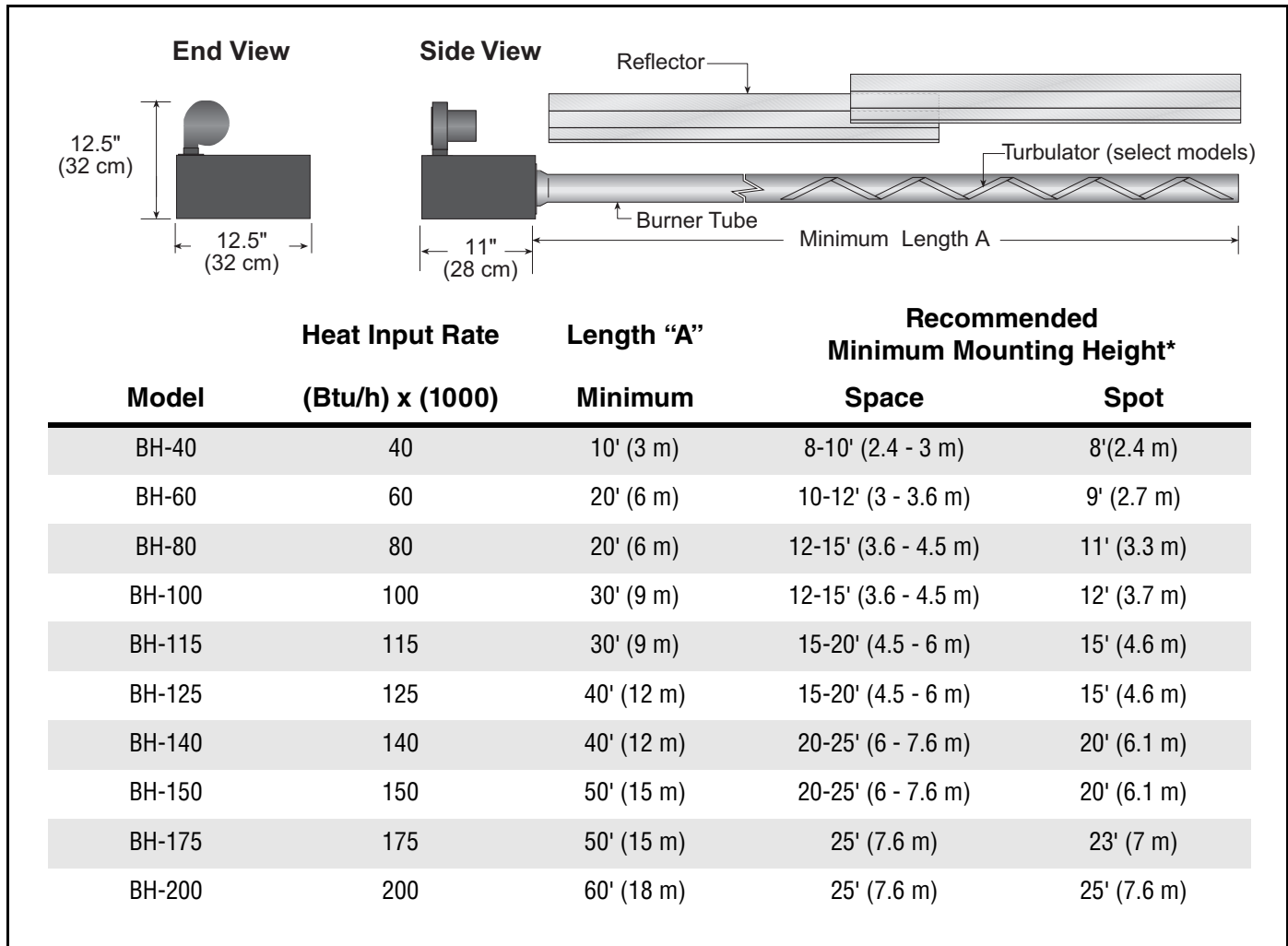
Fully automatic spark ignition with safety shut-off.
General Specifications for BH-Series heaters are as follows:

14.3 Suspension Specifications

Hang heater with materials with a minimum working load of 75 lbs (33 kg). See Page 14, Figure 14.

14.4 Controls Specifications

Time switches, thermostats, etc. can be wired into the electrical supply. External controls supplied as an optional extra.



*See Page 4, Section 3 for clearances to combustibles.

GAS PRESSURE AT MANIFOLD:

Natural Gas: 3.5" wc
LP Gas: 10.5" wc

PIPE CONNECTION:

1/2" NPT (for BH-40, 60, 80, 100, 115 & 125)
3/4" NPT (for BH- 140, 150,175 & 200)

DIMENSIONS:

Vent Connection Size: 4" (10 cm)
Outside Air Connection Size: 4" (10 cm)
Refer to figure above for dimensional information.

GAS INLET PRESSURE:

Natural Gas:
for BH-40, 60, 80, 100, 115, 125, 140, 150 4.6" wc Minimum
for BH-175, 200 5.0" wc Minimum
14.0" wc Maximum
LP Gas: 11.0" wc Minimum
14.0" wc Maximum

ELECTRICAL RATING (ALL MODELS):

120 V - 60 Hz, 1 A

SECTION 15: THE ROBERTS GORDON® GORDONRAY® BH WARRANTY**ROBERTS-GORDON LLC WILL PAY FOR:**

Within 36 months from date of purchase by buyer or 42 months from date of shipment by Roberts-Gordon LLC (whichever occurs first), replacement parts will be provided free of charge for any part of the product which fails due to a manufacturing or material defect.

Roberts-Gordon LLC will require the part in question to be returned to the factory. Roberts-Gordon LLC will, at its sole discretion, repair or replace after determining the nature of the defect and disposition of part in question.

ROBERTS GORDON® Replacement Parts are warranted for a period of 12 months from date of shipment from Roberts-Gordon LLC or the remaining ROBERTS GORDON® GORDONRAY® BH warranty.

ROBERTS-GORDON LLC WILL NOT PAY FOR:

Service trips, service calls and labor charges.

Shipment of replacement parts.

Claims where the total price of the goods have not been paid.

Damage due to:

- Improper installation, operation or maintenance.
- Misuse, abuse, neglect, or modification of the ROBERTS GORDON® GORDONRAY® BH in any way.
- Use of the ROBERTS GORDON® GORDONRAY® BH for other than its intended purpose.
- Incorrect gas or electrical supply, accident, fire, floods, acts of God, war, terrorism, or other casualty.
- Improper service, use of replacement parts or accessories not specified by Roberts-Gordon.
- Failure to install or maintain the ROBERTS GORDON® GORDONRAY® BH as directed in the Installation, Operation and Service Manual.
- Relocation of the ROBERTS GORDON® GORDONRAY® BH after initial installation
- Use of the ROBERTS GORDON® GORDONRAY® BH in a corrosive atmosphere containing contaminants.
- Use of the ROBERTS GORDON® GORDONRAY® BH in the vicinity of a combustible or explosive material.
- Any defect in the ROBERTS GORDON® GORDONRAY® BH arising from a drawing, design, or specification supplied by or on behalf of the consumer.
- Damage incurred during shipment. Claim must be filed with carrier.

WARRANTY IS VOID IF:

The ROBERTS GORDON® GORDONRAY® BH is not installed by an contractor qualified in the installation and service of gas fired heating equipment.

You cannot prove original purchase date and required annual maintenance history.

The data plate and/or serial number are removed, defaced, modified or altered in any way.

The ownership of the ROBERTS GORDON® GORDONRAY® BH is moved or transferred. This warranty is non-transferable.

Roberts-Gordon LLC is not permitted to inspect the damaged equipment and/or component parts.

READ YOUR INSTALLATION, OPERATION AND SERVICE MANUAL.

If you have questions about your equipment, contact your installing professional. Should you need Replacement Parts or have additional questions, call or write:

Roberts-Gordon LLC

1250 William Street

P.O. Box 44

Buffalo, New York 14240-0044

716.852.4400

On the web at: www.rg-inc.com

Roberts-Gordon LLC's liability, and your exclusive remedy, under this warranty or any implied warranty (including the implied warranties of merchantability and fitness for a particular purpose) is limited to providing replacement parts during the term of this warranty. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you. There are no rights, warranties or conditions, expressed or implied, statutory or otherwise, other than those contained in this warranty.

Roberts-Gordon LLC shall in no event be responsible for incidental or consequential damages or incur liability for damages in excess of the amount paid by you for the ROBERTS GORDON® GORDONRAY® BH .

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.

Roberts-Gordon LLC shall not be responsible for failure to perform under the terms of this warranty if caused by circumstances out of its control, including but not limited to war, fire, flood, strike, government or court orders, acts of God, terrorism, unavailability of supplies, parts or power. No person is authorized to assume for Roberts-Gordon LLC any other warranty, obligation or liability.

LIMITATIONS ON AUTHORITY OF REPRESENTATIVES:

No representative of Roberts-Gordon LLC, other than an Executive Officer, has authority to change or extend these provisions. Changes or extensions shall be binding only if confirmed in writing by Roberts-Gordon LLC's duly authorized Executive Officer.



OWNER WARRANTY REGISTRATION CARD

Mail or Fax to:

Roberts Gordon LLC • 1250 William Street, P.O. Box 44 • Buffalo, NY 14240-0044 • Phone: 716-852-4400 • Fax: 716-852-0854
Toll Free: 800-828-7450 • www.rg-inc.com

About the Owner:

Name: _____
Address: _____ City: _____ State: _____ Zip Code: _____
Phone: _____ Fax: _____ E-mail: _____

About the Installer:

Name: _____
Address: _____ City: _____ State: _____ Zip Code: _____
Phone: _____ Fax: _____ E-mail: _____

Purchased From (if different than installer):

Name: _____
Address: _____ City: _____ State: _____ Zip Code: _____
Phone: _____ Fax: _____ E-mail: _____

About your Heater:

Model #: _____ Serial #: _____ Fuel: _____ Installation Date: _____

Type of Installation (check one):

- Automotive Manufacturing Warehouse Recreational Aircraft
- Public Building Office Retail Agricultural Other _____

Installation Code and Annual Inspections: All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment.

To help facilitate optimum performance and safety, Roberts-Gordon recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon.

These products are not for residential use.

This product is intended to assist licensed professionals in the exercise of their professional judgment.

© 2009 Roberts-Gordon LLC - All rights reserved. No part of this work covered by the copyrights herein may be reproduced or copied in any form or by any means – graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems – without written permission of Roberts Gordon LLC. Printed in the U.S.A.

Attach this information to a wall near the ROBERTS GORDON® heater.




Read the Installation, Operation, and Service Manual thoroughly before installation, operation, or service.

Know your model number and installed configuration.

Model number and installed configuration are found on the burner and in the Installation, Operation and Service Manual.

Write the largest clearance dimensions with permanent ink according to your model number and configuration in the open spaces below.

OPERATING INSTRUCTIONS	⚠ WARNING
<ol style="list-style-type: none"> STOP! Read all safety instructions on this information sheet. Open the manual gas valve in the heater supply line. Turn on electric power to the heater. Set the thermostat to desired setting. 	 <p>Fire Hazard</p>
TO TURN OFF THE HEATER	
<ol style="list-style-type: none"> Set the thermostat to off or the lowest setting. 	<p>Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater.</p> <p>Some objects will catch fire or explode when placed close to heater.</p> <p>Failure to follow these instructions can result in death, injury or property damage.</p>
IF THE HEATER WILL NOT OPERATE, TO ENSURE YOUR SAFETY, FOLLOW THESE INSTRUCTIONS TO SHUT DOWN YOUR HEATER	
<ol style="list-style-type: none"> Set the thermostat to off or the lowest setting. Turn off electric power to the heater. Turn off the manual gas valve in the heater supply line. Call your registered installer/contractor qualified in the installation and service of gas-fired heating equipment. 	

**Maintain _____ clearance
to the side and
_____ clearance below
the heater from vehicles
and combustible materials.**

Roberts-Gordon LLC
1250 William Street
P.O. Box 44
Buffalo, NY 14240-0044 USA
Telephone: 716.852.4400
Fax: 716.852.0854
Toll Free: 800.828.7450

Roberts-Gordon Europe Limited
Unit A, Kings Hill Business Park
Darlaston Road, Wednesbury
West Midlands WS10 7SH UK
Telephone: +44 (0)121 506 7700
Fax: +44 (0)121 506 7701

Service Telephone: +44 (0)121 506 7709
Service Fax: +44 (0)121 506 7702
E-mail: uksales@rg-inc.com
E-mail: export@rg-inc.com

Installation Code and Annual Inspections:

All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment. To help facilitate optimum performance and safety, Roberts-Gordon recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon.

Further Information: Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through ROBERTS GORDON® representatives. Please contact us for any further information you may require, including the Installation, Operation and Service Manual.

This product is not for residential use.

© 2009 Roberts-Gordon LLC All rights reserved. No part of this work covered by the copyrights herein may be reproduced or copied in any form or by any means – graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems – without written permission of Roberts-Gordon LLC.